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Mild Steel Temperature Protection
Welding Locomotive Boilers
Ore Unloading Capacity Increased
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STEEL

The Magazine of Metalworking and Metalproducing

VOL. 120, NO. 5 FEBRUARY 3, 1947

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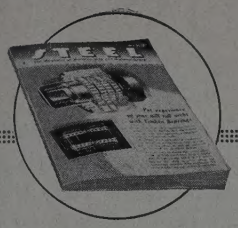

February 3, 1947

Headaches Ahead

This nation is heading straight into a thousand-and-one headaches in connection with postwar foreign trade. Neither the men in public office who decide policies and make the rules nor the management personnel of companies that are in a position to export or import goods have sufficient past experience or an adequate understanding of the ramifications of the big task ahead to enable them to proceed confidently in performing it. By necessity, they must muddle along haltingly by the trial and error method.

The over-all picture of postwar world trade is fairly clear. In the past the United States has been exporting about 10 per cent of the goods it produces and importing about 6 per cent of the goods it consumes. The recent war has made these traditional percentages meaningless and obsolete. From now on, we face a world condition wherein many other nations need more of our goods than they have ever received before and—even more important—they must have a greater opportunity than they have ever had previously to send us goods in sufficient volume to enable them to obtain dollars with which to buy the things they need urgently.

It is not likely that any informed person will challenge the soundness of this definition of the general problem. The headaches will arise from the attempts to work out policies that will conform to this world need of reciprocal trade and yet will not throw our own national economy too far out of balance.

A foretaste of what is ahead is discernible in the preliminary maneuvering in Washington. A few Republican leaders, including Senators Vandenburg and Taft, see the world situation quite clearly and wish to shape party tariff policy along new lines which will take this situation into account. Some other Republicans, fearful of possibilities under the Trade Agreements Act, are taking a position that might easily lead to a demand for a relatively high protective tariff. Responsible party leaders must realize the desirability of heading off at the outset any suspicion that the majority party is heading back toward prewar concepts of tariff policy.

What is needed more than anything else—by Congressmen and businessmen alike—is more trustworthy information regarding the foreign trade problem. Too many persons are tackling it with the outmoded implements of hunch and prejudice and too few are going at it with a sound knowledge of this nation's true and mandatory role in postwar world affairs.

• • •

LABOR SCENE TRANQUIL: While many observers are cautious about taking too much for granted in connection with the present status of industrial labor relations, it is certain that recent developments in the negotiations between representatives of United States Steel Corp. and the United Steelworkers have buoyed hopes that agreements eventually may be reached without strikes.

Extension of the wage contract between U. S. Steel subsidiaries and the union until Apr. 30, followed by similar extensions of contracts involving other steel companies and by a 30-day extension of the contract between Chrysler and the United Auto Workers, seems to insure at least several months of uninterrupted production at high levels in the metalworking industries. Other favorable developments are the return of free two-way bargaining as evidenced by the counter-proposals submitted by U. S. Steel subsidiaries in their negotiations with United Steelworkers, the agreement by these parties on the classifying of thousands of jobs in steel mills and the growing evidence that the portal-to-portal pay

(OVER)

suit strategy of the unions is back-firing.

Opposed to the encouraging import of these developments is the uncertainty still clouding the outcome of the John L. Lewis case in the Supreme Court. If the coal situation can be settled amicably, then the prospect for industrial peace will be brighter than it has been in several years. —pp. 68, 81

• • •

REPAIR WORK URGENT: Many operators of plants in the metalworking field face the problem of deciding whether they can wait for the delivery of machines or equipment that they have ordered or whether they must authorize extensive overhauling of existing old machines and equipment. In recent months, the postponement of delivery dates on ordered new equipment apparently has caused many companies to decide to go in for repairs on a grand scale.

Confirmation of this is found in the statistics on foundry equipment. A report of the American Foundry Equipment Manufacturers Association shows that the index of orders for repairs placed in December was 600.3, or six times the 1937-38-39 average of 100. This index has been running uniformly high throughout the last quarter of 1946.

As long as delivery dates are 12 months or more in the future, the volume of repair work on many types of equipment will continue abnormally high. —p. 72

• • •

WHAT IS IDEAL SITE?: National Carbon Co. will hold open house Feb. 5 and 6 to permit public inspection of its new $2 million plant at St. Albans, Vt., (population 8037). This news brings to mind the fact that National Carbon's other plants are at Bennington, Vt., (22,286); Fremont (14,710) and Fostoria (13,453), O.; Charlotte (100,899), Asheboro (6981) and Greenville (12,674), N. C.; Niagara Falls (78,029), N. Y.; Clarksburg (30,579), W. Va.; Columbia (10,579), Tenn.; and Cleveland.

This fairly widespread distribution of manufacturing facilities in cities and towns, which, with the exception of Cleveland and Charlotte, are of modest size as measured by population, raises the question as to what is the ideal location of a plant under the conditions prevailing in the postwar period.

Of course there are too many factors involved to permit a general, unqualified answer. Nevertheless, the argument for decentralization and for dispersal of industry into small communities has been strengthened by the experience of war and by present-day social trends. —p. 84

SIGNS OF THE TIMES: Accumulated orders for zinc-coated steel products, particularly galvanized roofing sheets, make it appear likely that when steel and zinc supplies permit, consumption of zinc for galvanizing will outstrip all previous records by a substantial margin. American Zinc Institute estimates that in 1946 zinc for galvanizing (p. 78) accounted for 325,000 tons of the total domestic consumption of 793,000 tons of slab zinc. Zinc consumed for diecasting reached an all-time peak in 1946. . . . Tests conducted intermittently since 1940 indicate that by applying and baking four successive layers of a thermo-setting plastic coating to the inside wall of oil well drill pipe (p. 124) many pipe failures caused by corrosion pitting during drilling operations can be prevented. . . . Since August, automobile and truck assemblies have been in the 350,000-400,000 range monthly and automobile builders now are hoping to step this up to 450,000 in April. If they succeed, production in the 12-month period from August, 1946, should be well over the 5,000,000 mark (p. 81), which would be a remarkable achievement in view of the obstacles encountered. . . . Industrial employment in the Los Angeles area in December totaled 193,000 (p. 87), which is only 3 per cent below the wartime high of 199,000. . . . New operating principles find application in two welding machines just introduced. In one, high air pressures up to 1000 psi control welding sequences in automatic high speed multispot resistance welding (p. 97) and in the other storage battery energy is employed to provide the excessive power needed for flash welding aluminum. . . . Believing that a serious copper shortage threatens the United States, Scovill Mfg. Co. is urging Congress to seek immediate repeal of the excise tax of 4 cents per pound (p. 79) which has been levied upon copper imports into this country since 1932. . . . Ford Motor Co. is displaying 2000 Ford and Mercury parts in Los Angeles and San Francisco (p. 86) and inviting Pacific Coast companies to bid on contracts for manufacturing these parts. . . . While some prices are breaking encouragingly, the Bureau of Labor Statistics index of commodity prices in primary markets is up to 140.8 (p. 168) from 140.0 in the previous week. Watch this index; a reversal in trend is imminent. . . . While bureaucracy fiddles, 20,000 army vehicles are rusting away near Ogden, Utah (p. 77), and the cost of neglect in other spots is mounting daily.

E. L. Shaner

EDITOR-IN-CHIEF

STEEL
February
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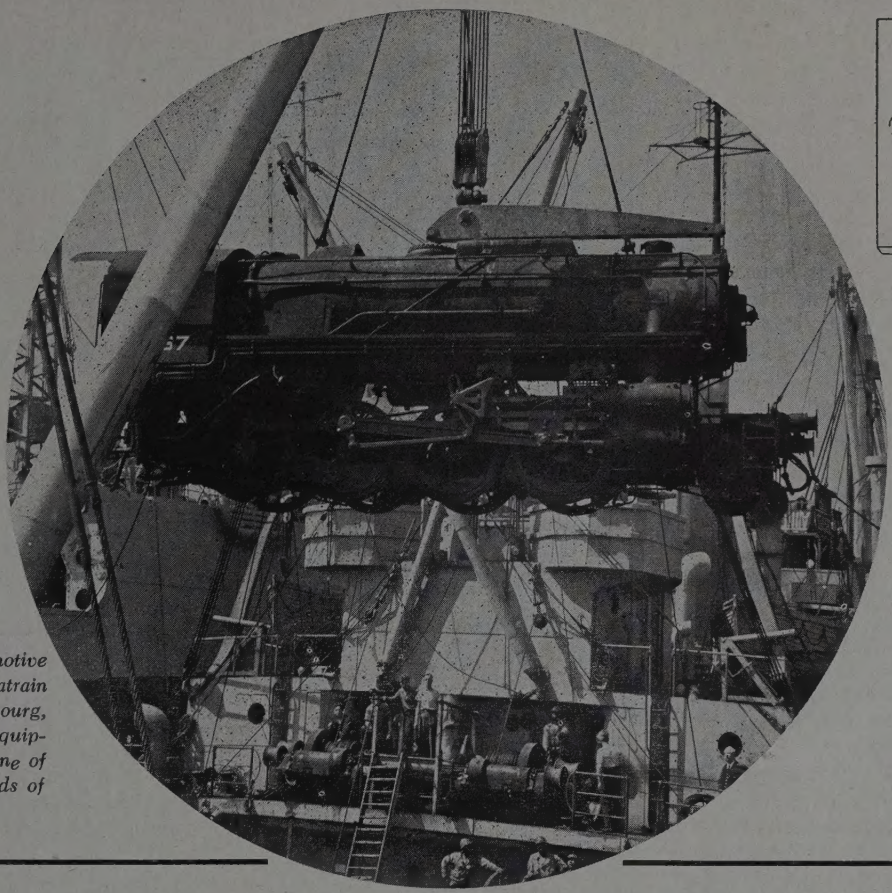
1947



American locomotive wings from seatrain to dock at Cherbourg, France. Rail equipment continues one of the principal needs of Europe

Tariff Battle Brewing in Congress

Makings at hand for spirited debate as administration strives to forestall postponement of Geneva tariff conference set for April. Republican thinking on subject divided. Reciprocal trade agreements program may be resting on volcano

A TARIFF battle is brewing which may explode one of these days with spectacular pyrotechnics in Congress. The makings are certainly at hand for one of the liveliest debates, if not one of the bitterest, on the subject in many a long year. The war is over, and the Republican party, traditionally tariff-minded and in control of Congress, can open up, if it wishes, the whole subject to extended debate.

The issue is particularly to the fore right now because of two events: 1. A movement by certain Republicans in Congress to block further implementation of the administration's trade agreements program; and, 2. Administraion plans to negotiate further tariff cuts with 23 countries this spring and press for formation of an international trade organization which would work with the United Nations for removal of trade barriers.

Strictly speaking, it is not a clear-cut battle between the parties that is brewing. As a matter of fact, it is unlikely the impending fight will resemble to any great degree the old slap-bang tariff battles between the Democrats and Republicans of the past. Actually, the issue crosses party lines with a wide split in thinking on the subject apparent in Republican ranks. Many influential Republicans are inclined to hold the tariff line about where it is, at least for the present, but a strong Republican bloc, unconvinced by the record under the Trade Agreements Act, is pressing for changes at least in policy.

In the confusion of thinking, Under Secretary of State William L. Clayton, who is carrying the ball for the administration in its program of extending the foreign trade agreements, finds himself in a tough spot. Currently the House Ways & Means Committee has before it two resolutions seeking postponement of further tariff negotiations pending review of the Reciprocal Trade Agreements program under which U. S. duties have been lowered about one-third over the past decade.

These resolutions, in effect, would force postponement of the International Tariff Conference scheduled to be held in Geneva, Switzerland, in April.

Such action, the administration feels, would be a body blow to international co-operation.

It is not impossible that the administration will give way to Republican viewpoint in some respects in effecting new trade agreements. At any rate, overtones at the hearings preparatory to negotiation of reciprocal trade agreements indicate a change in attitude on the part of administration officials. Up to the present, a one-way policy has

been pretty much the rule in tariff negotiations with other countries. We have been reducing our rates on imports in most cases without compensating benefits.

Numerous criticisms by Republicans have had their effect, and the members of the Committee on Reciprocity Information, handling the hearings for the State Department, give indications they realize the whole reciprocal trade agreements program is resting on a volcano. They have shown signs of being anxious to convince manufacturers and businessmen that in the coming negotiations they will put up a real fight to win advantages for Americans engaged in foreign trade.

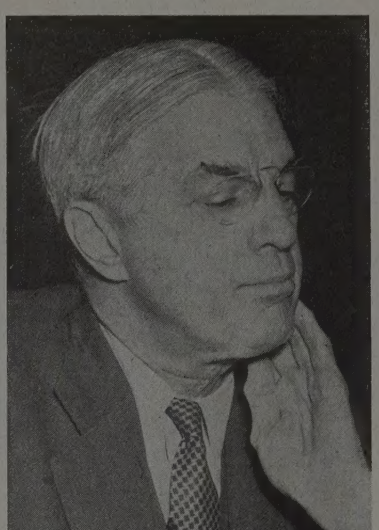
This disposition was reflected recently when William H. Johnstone, spokesman for the American Iron & Steel Institute, complained about the tariff walls American iron and steel products encounter abroad. The steelmaking countries like Great Britain, India, Australia, Canada and France, follow a uniform policy of excluding imports of those steel products which are made by their own mills.

By contrast, the United States market is virtually a free one; our iron and steel tariffs average a little less than 10 per cent based on current domestic iron and steel prices—and rates of 10 per cent or less do not serve as a barrier against imports.

Gives Three Recommendations

Taking the various angles into consideration, Mr. Johnstone suggested three approaches that would help the American iron and steel industry in its foreign trade operations in the future. First, an attempt should be made to get other steelmaking powers to reduce their tariffs on iron and steel products generally to somewhere near the level of the United States tariffs. Second, the so-called "imperial" preference that keeps American steel out of countries like Canada and India should be eliminated if possible. Third, special concessions should be sought on American steel products, like tin plate, which have good potential export markets now but are excluded by high tariff walls.

It was on this third recommendation that Mr. Johnstone got some encouragement from the committee. In considering the advisability of trying to compile accurate data on which to formulate the pattern of concessions to be sought, he explained, it was decided that such a study not only would be complicated, but also would be "quite useless." The committee did not agree with the latter conclusion. The presiding member, John W. Evans, representative of the Com-



WILLIAM L. CLAYTON

merce Department, asked Mr. Johnstone to proceed with this study.

"We are convinced that we are going to get concessions that will be worthwhile," declared Mr. Evans. "We want to see the steel industry get its share of them."

The committee view seemed to be that the tariff position of the iron and steel industry is quite liberal. The industry's request for minimum tariffs—or none at all—on basic raw materials like ores, tin, palm oil, nickel, ferrous scrap, etc., was received sympathetically by some committeemen who are impressed with the need for conservation of domestic reserves of items like manganese, chromite and tungsten ores.

Hearty denunciations of the existing trade treaty setup have come from various influential spokesmen at the hearings. Some statements have been received with no little surprise. For instance, Sen. Alben W. Barkley (Dem., Ky.) stated flatly at one session that he never has favored the idea of "free trade", asserting that no free trade proposals would win the support of the American people.

Telling criticisms were voiced by labor spokesmen. Matthew Woll, AFL vice president, denounced the setup in its entirety, holding that "reciprocal trade agreements were intended solely for an emergency period and not as permanent policy of the United States.

"Foreign workers have 2/3 to 1/3 of the productivity of American workers. They get 1/3 to 1/10 the wages paid in America. It should be evident that tariff rates, based on foreign valuations of 7½ per cent on printed matter, or 10 per cent on shoes, or 30 or 40 per cent on glassware and pottery products do not equalize the difference in wages or labor costs," said Mr. Woll.

H. Wickliffe Rose, American Tariff League, told the committee that the whole reciprocal trade agreements program is so bad that we ought to throw it out the window and take a fresh start.

"Rather than give away the markets of this country in an atmosphere of political trading," he said, "we should revise our Tariff Act, review all rates of duty, and make changes in the light of conditions and needs existing at home."

One of the grave faults in current thinking is the placing of so much emphasis on reducing rates, said Mr. Rose. "The law authorizes increases or reductions to the extent of 50 per cent—but there never has been any raising of rates; all the changes have been in the downward direction. What we need is a flexible tariff, and a flexible administrative setup—so that rates can be changed in the light of business conditions prevailing at the particular time."

Recommendations of John Abbink, chairman of the National Foreign Trade Council, were in marked contrast. He said: "We need imports of raw materials and other products to supplement our own resources and to correct the present great excess of exports over imports. We need to conserve our resources of scarce metals, minerals and other materials by importing. All excessive and unnecessary tariff duties should be eliminated. Tariff rates should be reduced to the lowest possible level."

Supports State Department

He supported the State Department attitude which is that international trade is required on a scale vastly in excess of any past level, and that world economy and that of the United States require imports into the United States on a scale far beyond any previous level. We also must help other nations acquire foreign exchange, especially dollar exchange, with which to purchase in available markets the capital equipment and other products necessary for their economic reconstruction, development and prosperity.

The issue is not as clearly drawn as the diverse opinions expressed at the hearings would seem to indicate. The position of this country in world affairs puts the tariff question in entirely different light than that of a decade ago and partisans of whatever political hue are conscious of the change which has taken place.

New Grade Classification for Flat-Rolled Carbon Steel Issued

Revision announced by American Rolling Mill Co., effective as of Jan. 29, expected to be followed by other leading producers . . . Specification, slitting, packaging extras also have been revised

AMERICAN Rolling Mill Co., Middletown, O., has established a new grade classification by sizes for flat hot-rolled carbon steel. This action, expected to be followed by other steel producers, became effective on shipments as of Jan. 29.

The sheet classification now extends to 0.299 in. thick instead of 0.203 in. Extras now apply to widths over 6 in. in thickness 0.230 in. and heavier and to widths over 48 in. in thickness 0.180 in. and heavier. Purpose of above revisions is to get line of gage classification between sheets and plates as far away as possible from conventional order thicknesses for plates.

New grade classification by size of flat hot-rolled carbon steel follows:

Thickness range 0.2300 in. and thicker and widths under 6 in. inclusive is a bar; over 6 in. a plate.

Thickness range 0.2299 in. to 0.2031 in. inclusive classified a bar up to 6 in. wide, inclusive; strip over 6 to 12 in.; sheet, over 12 to 48 in.; and plate, over 48 in.

Thickness range 0.2030 in. to 0.1800 in. is a strip under 12 in. wide, inclusive; sheet, over 12 in. to 48 in.; plate, over 48 in.

Thickness range 0.1799 in. to 0.0568 in. is strip under 12 in. wide, inclusive; over 12 in. a sheet.

Thickness range 0.0567 in. to 0.0449 in. is a strip under 6 in. wide, inclusive; sheet, over 6 in.

Thickness range 0.0448 in. to 0.0344 in. strip 6 in. wide and under; hot-rolled annealed sheet, over 6 in. Over 3½-in. wide in thickness range 0.0343 in. to 0.0255 in. is hot-rolled annealed sheet; 3½-in. and less, a strip. All width ranges 0.0254 in. and thinner carry a hot-rolled annealed sheet classification.

The standard sizes for hot-rolled sheets have been eliminated from the extra card. The item quantity extras and exact quantity extras now apply to all sizes. Previously the item quantity extras did not include standard sizes.

Specification extras for hot-rolled sheets have been revised, reflecting ASTM and U. S. Navy specifications in greater detail. An extra of 5 cents per 100 pounds for stress relieving test specimens is now charged. The extra for ordinary flange steel, ASTM-A-70 or equivalent, is 25 cents; similar extra also is charged for locomotive flange steel, ASTM-A-30 or equivalent.

Former slitting extra of 25 cents per 100 pounds now applies to cut lengths as well as coils, and has been revised as follows: 14 gage and heavier, 25 cents; 15 gage and lighter, 40 cents.

Packaging extras have been clarified and revised as follows:

An extra of 15 cents is charged for hand bundles, about 150 to 200 pounds clamped together with flat bundling bands. When a standard weight package is divided into loose, unwrapped lifts of less than 10,000 pounds each, with metal or wood separators, the following extras will apply in addition to regular packaging extras: Lift weights under 10,000 pounds to 5000 pounds; 1½ cents per 100 pounds; under 5000 to 2000 pounds, 2½ cents. No lift is to be lighter than 2000 pounds. These same extras will be made applicable to other sheet products, it is generally understood.

An extra of 5 cents for shrouding non-pickled sheets in 11 gage and heavier has been added to the extra card; also an extra of $1 per package for paper wrapping in excess of standard practice.

Carbon Cold-Rolled Strip Steel Extras Revised

Pittsburgh—Partial revision in carbon cold-rolled strip extras, is published in Sharon Steel Corp.'s new extra card, dated as of Dec. 10, 1946, replacing the previous card of Mar. 16, 1941. The new card shows sharp upward adjustments of as much as $1.15 per 100 pounds in size extras for heavier gages. The width ranges in the size extra schedule also have been revised. Previously there was a separate series of extras applicable on width range over 12 to 16-in. inclusive, and over 16 to 23⅛-in., in-

(*Please turn to page* 178)

Present, Past and Pending

■ WEIRTON STARTS 66-IN. HOT STRIP MILL

WEIRTON, W. VA.—Weirton Steel Co.'s new 66-in. hot strip mill, with a capacity of 135,000 tons a month, rolled its first steel Jan. 29. It replaces a 48-in. mill which ceased operations Jan. 13. During the interim, 800 men worked on round-the-clock shifts to install the new mill.

■ TENNESSEE COPPER LEASES ORDNANCE PLANT

BIRMINGHAM, ALA.—War Department has approved plan to lease the Oleum plant of Alabama Ordnance Works to the Tennessee Copper Co. Plant will be used to manufacture sulphuric acid.

■ AUTHORIZE APRIL, MAY TIN PLATE EXPORTS

WASHINGTON—Civilian Production Administration has authorized 65,000 tons of tin plate for April and May export licensing by the Office of International Trade. This does not assure that exports actually will reach this level as foreign shipments will depend on production.

■ NORTH AMERICAN ACQUIRES PLANT SPACE AT DOUGLAS

LONG BEACH, CALIF.—North American Aviation Inc., Los Angeles, has acquired 500,000 sq ft of plant space in the former Douglas Aircraft plant here for the construction of military aircraft. Employment will run between 2000 and 2500.

■ ELECTRICAL ENGINEERS PRESENT MEDALS

NEW YORK—Dr. L. W. Chubb, director of Westinghouse Research Laboratories, was presented the John Fritz Medal for notable scientific and industrial achievements during 1946 by the American Institute of Electrical Engineers. Dr. Vannevar Bush, chairman of the Joint Research & Development Board of the Army and Navy, received the Hoover Medal for outstanding public service. Dr. Lee de Forest, Chicago and Los Angeles, was presented the 1946 Edison Medal for pioneering achievements in radio.

■ LUKENS ANNOUNCES FULL LINE OF STAINLESS-CLAD STEELS

COATESVILLE, PA.—Manufacture of a complete line of stainless-clad steels is announced by Lukens Steel Co. Lukens began production of clad metals 17 years ago with nickel-clad steel and later developed inconel-clad and monel-clad steels.

Steel Wage Pact Extender Buoys Production Hope

Several months of industrial peace virtually assured; new output records for first quarter foreseen. Darkest cloud on labor horizon believed possibility of new coal strike in April

SEVERAL months of high and uninterrupted production in the metalworking industries has been virtually assured by the extension of the steel wage contract between United States Steel Corp. subsidiaries and the United Steelworkers until April 30. Most industrialists believe the first quarter will see new postwar records in production of finished steel and in manufactured hard goods.

Similar extensions were being made last week by other steel producers and the union. In the automotive field, Chrysler Corp. and the United Auto Workers announced their contract had been extended for 30 days. Contracts of General Motors and Ford still have several months to run.

The same forces that prompted the United Steelworkers to agree to the contract extension will work on other unions in the metalworking industries and it is likely that labor-management relations for at least the immediate future will be peaceful.

Several other developments in the labor-management field bolstered an optimistic outlook for industrial peace. These include:

1. The return of free two-way bargaining as evidenced by the counter-proposals submitted by U. S. Steel subsidiaries in their negotiations with the United Steelworkers. U. S. Steel informed the union it will expect a fair day's work for a fair day's pay, that it intends to retain the rights of management, that employees should be free to join or not to join a union, and the union must accept responsibility for fulfilling its part of the bargain.

2. Agreement between the union and U. S. Steel in classifying the thousands of jobs in steel mills and the establishment of specific job classification rates. This step is expected to reduce materially the grievances which in the past several years have been responsible for many minor work stoppages.

3. Increasing indications that union portal-to-portal pay suit strategy is backfiring and belief that the threatened liability of industry largely will be dissipated. Unionists privately admit that chances for collecting large sums for back walking time are dimming in the face of congressional and public opposition and by the avalanche of legislation and counter legal actions which are pending.

Clouding this generally favorable outlook is one dark prospect. That is that John L. Lewis may win his bout with the government in a Supreme Court decision later this month and that he may call out his miners again on April 1. A nation-wide coal strike in the spring, of course, could nullify all the progress made toward industrial peace.

Extension of the steel wage contracts was made on the industry's proposal, although the union quickly acceded. Both parties expressed their desire to "make a contribution to the national welfare" and pointed out that the extension will permit time for careful exploration of the proposals on each side and also will permit the clarification of industry's liability under the portal-to-portal pay suits. The concern expressed by the union over the uncertainty of industry regarding its liabilities under the portal pay suits, brought by the union, caused some cynical smiles.

Benjamin F. Fairless, U. S. Steel president, in announcing the extension, said:

"Our companies have been sued for over one-half billion dollars for alleged past portal-to-portal liability. The cla is made in these suits that our e ployees should now be paid retroactive as far back as 1938 for walking work on company property, for chan ing clothes, and for time spent in wa ing. The amount for these activities computed at overtime rates and then doubled under the penalty provisio provided in the Wage and Hour La No one contends that the employ were not paid their full wages in acco ance with the terms of the then existi labor contracts for all time actu worked as work was then understood a accepted by both parties.

"In the midst of this serious situati had the union not agreed to the contr extension, we would have found o selves facing an immediate demand raise wages without knowing how l an individual employee works each d and how much he is entitled to rece at the end of the day—if the portal-portal pay theory is to be imposed. T union's demand for a substantial wage crease and its separate demand for port to-portal pay both involve higher wa costs. They must be considered togeth

Industrial peace for the next few months appears assured by the extension of current wage contracts between steel producers and the union. This is expected to result in new postwar records in industrial production. Photo shows GE worker welding rotor ring for a large generator at General Electric Co.'s Schenectady, N. Y., plant

"This critical problem has been recog-ized by the Congress and bills are now nder consideration. If legislation or rther court decisions correct the pres-t confused situation, both parties should e able to negotiate a labor contract ith some understanding of the legal quirements and financial consequences.

"Until this matter is clarified the parties lan to continue collective bargaining nferences in an attempt to reach agree-ent on changes proposed for the new greement, either by the companies or e union, which do not relate to cost spects.

"No understanding has been reached at any contract terms ultimately agreed pon will be retroactive. This is a sub-ct for future negotiation, along with all e other matters to be negotiated."

Higher Productivity, Open Shop Asked

THIRTEEN counter-proposals for in-rporation in a labor agreement were ade by U. S. Steel subsidiaries as nego-ations continued under the extended ntract.

A fair day's work for a fair day's pay one of the principal conditions that ill be required by the corporation.

A second major point is insistence that mployees have the right to determine for emselves, free from intimidation, coer-ion or discrimination from any source, hether or not to become or to continue member of the union.

The corporation further stipulates that oth parties be bound by a no strike-no ckout pledge, by penalties for failure to ve up to the agreement and by com-ulsory arbitration for grievances arising nder the contract with functions of the rbiter limited to determinations involv-ng interpretation, application or com-liance with the contract provisions.

Some of the companies' proposals are xpressed or implied by the language of he present agreement, but the companies elieve the new contract should contain learer statements and more logical rrangements of the conditions so as to inimize the possibilities of erroneous in-erpretations and to facilitate administra-ion of the contract in the plants as well s in arbitration.

One such section defines the authority f management, as follows:

The authority and responsibility of he company to manage the business and o direct the working forces consistent vith the provisions of the agreement hall not be abridged, and management hall not be obstructed by acts of the nion, its representatives or employees of the company represented by the union. In making the agreement, it shall be clearly understood that:

(a) The provisions of the agreement shall in no way assign or be interpreted to assign to the union, its representatives, or any of the employees represented by the union any of the authority or responsibility which is vested in management.

(b) The company, consistent with the provisions of the agreement, shall determine and decide such matters as how, when and where the company will:

(1) Establish new jobs or abolish or change existing jobs;

(2) Increase or decrease the number of jobs in the various departments;

(3) Apply wage incentives;

(4) Change materials, products, processes, equipment or operations;

(5) Schedule employees, operations, and work to be performed;

(6) Promote, demote, transfer, terminate or hire employees; and

(7) Maintain discipline of employees.

Accord Reached on Job Classification

AGREEMENT on a job classification system and standard hourly wage scales, the result of two years of negotiations between U. S. Steel and the union, was announced soon after the present wage contract was extended. This agreement is expected to eliminate many grievances over alleged wage inequities.

Under the agreement, more than 25,000 widely varied steel mill jobs are grouped into 30 general labor classifications, with a proper relationship established between respective wage rates for the various classifications.

Thus, sweepers and janitors are placed in job class 0-1, which carries a wage rate of 96½ cents an hour under the present agreement. General labor is in job class 2, carrying a rate of $1 an hour. Heavy and dirty labor and oilers are in job class 4, receiving $1.07 an hour. Shop helpers fall in job class 5, carrying $1.10½ an hour. Rollers in finishing mills are in job classes 19, 20 and 21, receiving from $1.59½ to $1.66½ an hour. Highest paid workers are the blooming mill rollers and blowers in bessemer in job classes 26 to 30 and receiving up to $1.98 an hour under the present contract.

Joint committees of management and labor are at work in 84 other steel companies attempting to set up similar schedules.

The agreement provides for retroactive payments, to Jan. 4, 1944, of 70 per cent of the total hourly adjustments which will be applicable to them in the future. For the steel producing subsidiaries of U. S. Steel, this will mean retroactive payments in excess of $30 million. The union estimates the revision will add $17 million annually to corporation payrolls.

For the entire industry, the union estimates retroactive payments of $100 million will be required and that the industry wage bill will be raised by $50 million annually in the future. Retroactive payments will be made in lump sums.

Union's Portal Pay Strategy Backfires

THE spectre of hundreds of companies being reduced to insolvency through portal-to-portal pay suits demanding close to $5 billion is evaporating in the face of aroused congressional and public opinion.

Union leaders are beginning to wonder about the wisdom of their strategy in filing these suits and many privately concede they have little hope of collecting large sums through them.

Few companies have indicated any desire to compromise the unions' demands. There are two reasons for their reluctance. One is that the present law does not recognize any compromise settlements. The second is that industry is encouraged by the apparent determination of Congress to outlaw portal pay suits.

A plethora of measures to curb the back portal pay suits already have been introduced in Congress and early action on this issue appears assured, either through outlawing such suits or placing a 100 per cent tax on portal-to-portal windfalls to workers.

Attorney General Tom Clark has filed a brief with Judge Frank A. Picard of the United States District Court of the Eastern District who handed down the original decision in the Mt. Clemens Pottery Co. case, asking for dismissal of the workers' claims unless new evidence can be introduced to add weight to the pottery workers' claims.

Little Change Reported in Bookings of Electric Trucks

Domestic bookings for electric industrial trucks and tractors in November showed little change from October. Net value of chassis only booked in November totaled $1,297,006, compared with $1,219,469 during October, the Electric Industrial Truck Association, Chicago, reported.

United States Steel Corp.'s 1946 Net Profit Largest Since 1941

Strike costs, estimated at $29,200,000, charged to special reserve instead of income. Corporation making slight headway in reducing backlog, now five months against six months at end of third quarter. Freight rate increases impose heavy burden

UNITED STATES Steel Corp. reported for 1946 its largest net income since 1941. However, it was able to do so only by charging the expense of strikes and certain war costs to a special fund set up in earlier years.

The 1946 net income is reported as $88,683,530, compared with $116,171,075 in 1941. Had the corporation not charged against a special fund $29,200,000 for strike costs and certain war costs the 1946 net income would have been shown only as $59,483,530, just slightly above the 1945 net income of $58,015,056.

Until 1946, net income had been declining each year since 1941. Fourth quarter income in 1946 was down slightly, being $31,215,636, compared with $33,329,353 in the third quarter.

Net current assets of the corporation and its subsidiaries at Dec. 31, 1946, after deducting current dividend declarations, were $629,159,702, compared with $600,760,252 at Dec. 31, 1945.

Of the reserve, provided during the war years, for estimated additional costs arising out of the war, $912,906 was used in the fourth quarter of 1946 to cover increased costs of replacing inventories depleted during the war. Balance in this reserve at Dec. 31, 1946, was $27,961,425.

Improvements Made to Fixed Assets

During 1946, total additions to and betterments of fixed assets amounted to approximately $201 million. This amount includes $110 million which represents the price of facilities purchased during the year from the government. Balance of the funds segregated for property additions, after deducting the cost of these facilities purchased from the government, is $140 million. On Dec. 31, 1946, additional expenditures planned for property additions and replacements amounted to around $278 million.

Amount of long term debt outstanding at Dec. 31, 1946, was $87,521,601, compared with $92,716,293 at Dec. 31, 1945.

Average number of employees was down to 275,805 in the fourth quarter, compared with 276,793 in the third quarter. However, fourth quarter payroll was up to $195,602,340, compared with $194,888,028 in the third quarter. Average number of employees for the year was down to 266,727 in 1946, compared with 279,274 in 1945. Total payroll for 1946 was $694,114,463. In 1945 it was $786,721,918.

The corporation reported steel products shipments of 4,902,742 net tons in the fourth quarter of 1946, compared with 4,457,557 in the third quarter that year, and 4,096,568 in the fourth quarter of 1945. Subject to yearend adjustments, 1946 shipments totaled 15,247,752 net tons, a decrease of 3,162,512 tons from 1945. However, shipments in only five former peacetime years exceeded those in 1946. Peacetime record was 16,812,650 net tons shipped in 1929.

Largely as a result of strikes, production of steel ingots and castings in 1946 averaged only 72.9 per cent of rated capacity. Steel production in the fourth quarter of 1946 averaged 87.4 per cent of rated capacity. The corporation estimates it lost 6.3 million tons of steel production because of the steel and coal strikes in 1946.

The corporation is making some headway in reducing its steel backlog, Chairman Irving S. Olds indicated. Unfilled orders now are the equivalent of five months' production at the present rate of operation, as compared with six months three months ago.

However, he said, steel demand is still pressing and it should take at least six months of consistently high operations to relieve consuming pressure appreciably. Steel sales offices of the corporation continue to receive many requests for tonnage which they are unable to supply, despite high operations.

Mr. Olds said he saw no real evidence of duplicated orders, although he remarked that under present conditions there must be some. The corporation's steel exports last year were between 5 and 6 per cent of total finished steel shipments and at present are averaging around 6 per cent, he said.

Commenting upon the continued shortage of freight cars and pressure for steel to build new ones, he said he thought the government had set its sights too high in its present plans for expanding freight car construction. There simply is not sufficient steel in prospect, he believes.

The steel corporation has arrived at a capacity rating for its Geneva, Utah, plant of 784,000 tons, bringing total ingot capacity rating for its subsidiaries up to 29,547,200 tons, with due allowance for adjustments at various other plants of about 50,000 tons. The figure represents what corporation officials believe to be a fair peacetime rating, one that is approximately 60 per cent of the Geneva plant's potential wartime capacity.

Work on finishing capacity there is proceeding slowly, Mr. Olds said, due to continued difficulty in obtaining necessary equipment, especially electrical equipment. In fact, that applied to the corporation's expansion program in general. There would be no production of hot rolled coils at Geneva this year, he was sure. Meanwhile, principal production is in plates and shapes, production on the latter getting under way last November.

Mr. Olds reported 24 "portal-to-portal" suits have been filed against the corporation to date, with 18 specific amounts totaling $618 million, not including legal fees which may be involved. "The demands," he said, "are so fantastic, so beyond any ability to pay, that there must be some remedial relief." Such relief may come through legislative or Supreme Court action, he indicated, nevertheless, the demands must be taken most seriously.

Wage Demands Remain Uncertain

He said the United Steelworkers have as yet submitted no specific wage demands, other than to say the increases they want will be "substantial." The corporation chairman said wage increases in 1946 cost the corporation $26 million. Asked whether he saw any evidences of improved efficiency among workers, Mr. Olds said it was difficult so far to say as there isn't a very definite yardstick to go by.

In reply to a question, he said he had nothing on the current break-even point for his company or the industry.

Recent freight rate increases will impose a direct burden on the steel corporation of $20 million a year, he estimated. They will also impose a substantial burden, which cannot at present be estimated, through materials and commodities purchased. Increases in freight rates emphasize, he said, the importance of having plants in consuming districts.

Recent reports that steel corporation interests were buying land near Baltimore for tidewater operations were without foundation, Mr. Olds said.

Study and development of a sour

ıcentive program to rectify any existing ıage inequalities is being started by the eel corporation, now that the task of ɔb reclassification has been completed.

Jones & Laughlin Reports ncrease in Net Income

Increase in net income for the last uarter of 1946 and also for the entire ear was reported last week by Jones Laughlin Steel Corp., Pittsburgh.

For the last quarter net income was ,744,824, compared with $2,367,774 the corresponding period of 1945 and ,952,716 in the third quarter of 1946. et income for the year totaled $10,-54,084, compared with $8,082,082 in 945. Of the 1946 net profit, $4 million me from the contingency reserve to lp offset extraordinary expenses.

Keystone Steel Sets New Quarterly Profit Record

Net profit of Keystone Steel & Wire ɔ., Peoria, Ill., in the last three months 1946 set a new high record for a uarterly period. At $1,175,392, it was ore than double the $537,329 net profit the last quarter of 1945.

In the last six months of 1946 the mpany's net profit aggregated $2,091,-5, compared with $822,468 in the last lf of 1945.

The profit showing of the last quarter 1946 is to a great extent the result, d the company, of the increased tonnage of finished products the company is now selling compared with previous years when sales included a large tonnage of semifinished products. Both sales and earnings, the company said, are reflecting the benefits of expansion during the past several years of capacities for producing the relatively more profitable finished wire products. Except for a comparatively small tonnage of semifinished steel supplied to subsidiaries, Keystone is now converting practically its entire basic steel production into finished products. Before the war, approximately one-fourth of Keystone's steel output was sold in semifinished form.

Increase in Net Income Shown by Inland Steel Co.

Inland Steel Co., Chicago, has reported its net income for 1946 was $15,-556,897 before deducting $1,012,776 allocated to contingency reserve for possible future inventory price decline and other purposes. Net income in 1945 was $9,861,210.

The 1946 net income of $15,556,897 is after deducting strike costs and retroactive pay of $3,041,850.

Wheeling Steel Reports On Net Earnings for 1946

Preliminary report of Wheeling Steel Corp., Wheeling, W. Va., shows a net profit for 1946 of $5,372,910 after all charges including federal taxes but before deducting a net loss of $2,012,522 charged directly against surplus as a result of the sale of the corporation's Portsmouth plant last July.

In 1945, net profit was $3,950,252.

Lukens Steel Co. Reports Net Profit of $360,050

Net profit of $360,050 has been reported by Lukens Steel Co. and subsidiaries, Coatesville, Pa., for the first quarter of their 1947 fiscal year which ended Dec. 28, 1946. This is in contrast with a net loss of $156,929 in the corresponding period of the 1946 fiscal year.

Bethlehem 1946 Profits Equal to $11.79 a Share

Bethlehem Steel Corp.'s net profit for 1946 was $41,731,931, after provision for $15,500,000 for income taxes. This compares with a net of $34,947,116, after provision of $12,200,000 for taxes, in 1945.

For the fourth quarter, the corporation's income was $11,937,281, after all charges and allowing $4,790,000 for taxes. This compares with $10,543,005 in the September quarter, after allowance of $7,160,000 for taxes, and with $11,447,858, after tax allowance of $4,-630,000 in the fourth quarter of 1945.

Earnings for all of 1946 were equal to $11.79 a common share. Fourth quarter earnings were $3.45 a common share.

Steel Export Priority Tonnage To Be Increased

Steel producers are required to accept any priority orders issued under the current steel export program of the Civilian Production Administration as a result of that agency's action last week eliminating the former general 2 per cent limit of production over which producers formerly were permitted to reject rated export orders.

Total rated export orders in 1946 were less than 2 per cent of estimated overall output of 47 million tons of steel products, CPA officials said. However, a limit has now been removed because 1947 foreseeable exports will require more than 2 per cent of some products, but less of others.

The overall steel program will be held closely to the 1946 ratio of rated export orders to total production, the agency said. The export program on which priorities assistance is to be given in first quarter includes tonnages for shipment in April and May, as the complete program is not yet fully determined.

JET BOMBER: First official view of the XB-46, experimental four-jet bomber being built for the Army Air Forces by Consolidated Vultee Aircraft Corp. It has been under secret construction at Convair's San Diego, Calif., plant for the past two years. The medium bomber is powered by four General Electric turbojet engines located in two low-slung nacelles and is now undergoing preliminary tests

Shortage of New Equipment Spurs Rate of Repairs

With new equipment difficult to obtain, foundries find it necessary to continue heavy volume of repairing

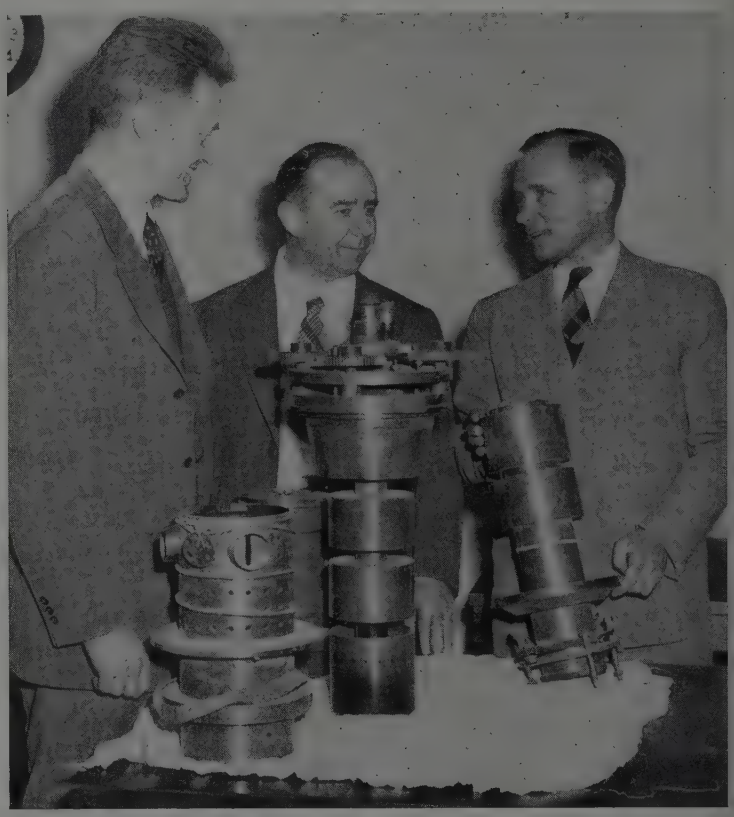
BECAUSE backlogs of orders for new foundry equipment are still heavy, foundries continue to find it necessary to do a considerable volume of repairing of existing equipment.

An indication of this is a report by the Foundry Equipment Manufacturers Association, Cleveland, that the index of orders placed in December for repairs was 600.3 per cent, six times the 1937-38-39 average of 100. The repair index was higher in each of the last three months of 1946 than in any of the other months that year. Low month of the year was February, with a 342.6 per cent index.

Contributing to difficulties in making deliveries of new equipment are materials and components shortages, particularly ball bearings, fractional horsepower motors, and castings. Delivery dates are said to average 12 months in the future, with some equipment available within six months and other types not deliverable for two years.

Prices on new equipment for foundries are reported holding near the previous government price ceilings.

Current ordering of new equipment probably would be at a higher level if earlier deliveries could be made. In December, the index of new equipment orders was 379 per cent of the 1937-38-39 average of 100, compared with 421 in November and last year's monthly high of 779.8 per cent in April. Increased labor costs and difficulty in obtaining satisfactory foundry labor are expected to contribute to increased mechanization of foundries with a resultant sustained demand for new equipment.



GENERATE LOTS OF POWER: These are the principal parts of the "resnatron," an electronic tube which generates immense quantities of high frequency current. It was used during the war to jam enemy radar and will be adapted to peacetime television and frequency modulated radio. Parts shown were taken from the tube which is claimed to have broken the world's power record by delivering 140 kilowatts of continuous power. Shown examining them are three scientists of the University of California who aided in developing the tube. Left to right: Dr. David Sloan, Dr. Winfield Salisbury, and Dr. L. C. Marshall. NEA photo

Supply of WAA Surplus Machine Tools Increased

Supply of government surplus equipment for sale to the public has been increased by greatly reducing the list of short supply machine tools, available only to priority holders, the Cleveland regional office of the War Assets Administration announced.

By carefully analyzing machine tool sales, WAA officials learned that many machines placed on that list were not in demand by priority holders and were, therefore, removed and placed on the open market. This allows licensed dealers to have an increased selection of tools to sell.

To help industry understand the WAA program for obtaining new machine tools, six WAA representatives in the Cleveland region are making visits to plants.

WAA Restrictions Lifted From Surplus for Export

Lifting of restrictions on sale of surplus property for export, except those controls governed by other agencies, has been announced by War Assets Administration.

In a statement of policy, WAA said that prospective purchasers for export shall receive notice of and can partic pate in all public offerings of surplus on an equal basis with other purchase for domestic use having the same stat with respect to priorities. Thus, WAA making sales shall accord to non-priori exporters the same treatment as to pric quantities apportioned and other conc tions of sale as are accorded to any no priority purchaser, including wholesal or dealer.

WAA explained that shortages in ma commodities are disappearing as produ tion increases and that to the extent th surpluses can be sold abroad, the d mestic market is relieved and left op to absorb new production. The agen also pointed out that the sale of surpl commodities in foreign countries will a in the development of future export ma kets for the United States.

Canadian Iron and Steel Makers Still Look for Ceiling Price Increase

Hope for action in ferrous group similar to that taken with boost granted in nonferrous metal prices, but chances thought less promising as government officials in Ottawa remain silent on the matter

CANADIAN iron and steel producers ntinue to look hopefully to Wartime ces and Trade Board for a boost in ling prices, and it is believed in some rters that the lift in nonferrous metal ces may be followed by somewhat sim- action in the ferrous group. How- r, no pronouncements, one way or ther, have been coming from Ottawa cials in this matter, and so it is now erally conceded that if an upward re- ion is made it will come as something a surprise.

n the meantime any new business be- booked by steelmakers is taken with ces to be made known at time of ship- nt. New order placing in the Cana- n markets is restricted, due to the fact t most producers now are fully booked l have little or no surplus capacity aining to the end of June. While duction is being maintained virtually capacity of raw steel supply and ship- nts of various steel materials have eded up in the past month or six eks, there is still a wide gulf between pply and demand, and it is not ex- ted that there will be much equaliza- n before last quarter or possibly early 1948.

Capacities Booked Well Ahead

Sheetmakers are out of the market, and y will not accept new orders before rd quarter for either black or galvan- l sheets. Business is developing on broader scale for steel plate, and or- s from shipbuilders and locomotive nufacturers, as well as consumers in er trades, will keep Canadian plate ls at capacity operations for most of year. Practically all carbon bar ca- ity is filled to the end of June, but re is still additional capacity avail- e this quarter on alloy bars.

Fabricators are still taking orders on vy structural shapes even though the klogs alone will take maximum out- until the end of September. It is imated that almost 50,000 tons of ictural steel are pending in connec- n with construction programs an- nced within the past three months.

The scrap supply situation is steadily rsening. There are indications that ne accumulations are being held off market in the hope of higher prices. However, even if all scrap in Canada were thown on the market, it is believed the shortage would continue. Some large Ontario scrap consumers have been bringing it from England and the European continent, pointing out that they are unable to obtain much scrap from domestic sources and the price differential shuts out United States supplies.

Nonferrous Metal Prices Rise

Donald Gordon, director of Wartime Prices and Trade Board, of Canada, has announced an increase in domestic nonferrous metal prices. The ceiling on copper has been raised from 11.5 cents to 16.625 cents per pound; lead from 5 cents to 10.625 cents and zinc from 5.75 to 10.25 cents per pound.

Exports Hit Peacetime High

Canada's export trade for November totaled $232,219,000 compared with $204,150,000 for October and $238,637,000 for November, 1945. For the 11 months ended with November exports had a total value of $2,100,313,000 which was the highest peacetime figure on record, but was approximately 30 per cent below the value for a similar period in 1945 when war and relief shipments were heavy. They were well above the annual average of $884,536,000 for the five prewar years, 1935-39. Exports of iron and steel products in November were valued at $18,921,000 against $10,658,000 in October and $17,181,000 in November, 1945. In November nonferrous metal products as a group were exported to the value of $27,468,000, a gain of about $1,300,000 over November, 1945.

French Industrial Recovery Program Beset by Wage Disputes and Inflation

PARIS

STRENGTHENED by formal approval of the National Assembly and bolstered by the anti-inflation drive to reduce prices 5 per cent, the French industrial recovery plan has weathered its first month although harassed by several issues, particularly the wage question.

Insistent demands were made by state and utility corporation employees for higher salaries, so that the government was forced to yield to the claims despite its anti-inflation measures. Still unsatisfied, the workers threaten to reopen the issue once the new ministry of Premier Paul Ramadier is better organized. Moreover, another serious wage demand remains with the continued agitation of all low-salaried workers, public as well as private, for a minimum pay of approximately $60 per month with an additional 20 per cent for a 48-hour week which would bring it up to $70. These demands are backed by the General Confederation of Labor which is under a strong Communistic influence.

Industrialists, on the other hand, point to banknote printing activities of the government as among the chief contributing factors to spiralling prices, which in turn precipitate the wage demands. They call for a remedy of this ill and indicate that the establishment of a minimum wage throughout France would have as one of its effects still another jump in prices with a particularly heavy burden upon the government which would find itself faced with an even heavier civil servant salary list in spite of the fact that it is already struggling with a large budget deficit.

Integration of six basic industries is the immediate objective of the four-year industrial program, and a start has been made to this end among the industries concerned, which include iron and steel, coal, electricity, cement, agricultural machinery and transportation. Steel production remains about the same, with an output of about 85 per cent of that produced in 1938. In December 448,000 metric tons were recorded, which is 86 per cent of the figure for December, 1938. By the end of the year it is expected that France will be producing 125 per cent of her 1929 output, this having been the record year.

Much benefit for French industrial recovery is expected to arise from talks between Leon Blum, immediate past socialist premier, and officials of the British Labor government. France hopes to reach an economic agreement with Britain whereby an effort will be made to relate each country's production schedules, export and import programs, investment arrangements and economic policies pursued in the British and French colonial empires.

Windows of Washington

By E. C. KREUTZBERG — *Washington Editor, STE*

Justice Department unable to grant blanket immunity from prosecution under antitrust laws to industry advisory committees. Army and Navy Munitions Board plans to organize 17 advisory groups on materials and 12 on end products

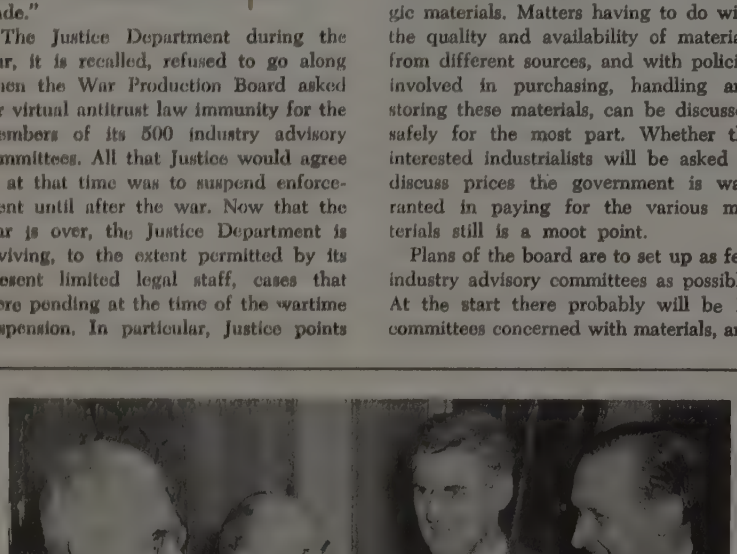
IN PREPARING to organize a number of industry advisory committees, Army and Navy Munitions Board attorneys are being forced to proceed without any great comfort from the Justice Department. In brief, the Justice Department cannot grant any blanket immunity, and companies participating in the activities of these committees must avoid violating the antitrust laws.

In essence, the Justice Department position is: "It is not illegal to hold meetings—you can ask anybody for advice and information. But do not discuss matters that might result in price agreements, curtailment of production or in unlawful combinations in restraint of trade."

The Justice Department during the war, it is recalled, refused to go along when the War Production Board asked for virtual antitrust law immunity for the members of its 500 industry advisory committees. All that Justice would agree to at that time was to suspend enforcement until after the war. Now that the war is over, the Justice Department is reviving, to the extent permitted by its present limited legal staff, cases that were pending at the time of the wartime suspension. In particular, Justice points out that it is trying to carry out President Truman's recent mandate that the antitrust laws be prosecuted vigorously.

The key to keeping co-operating industrialists out of trouble, Army and Navy Munitions Board attorneys believe, is to prepare carefully for the meetings with industry advisory committees and confine the discussions to subjects that will not invite violations of the antitrust laws. The immediate problem is to prepare the agenda for meetings with committees to be called into existence under the stockpiling act of 1946. Under this law the board is required to discuss with the interested industrialists the problems incident to stockpiling of critical and strategic materials. Matters having to do with the quality and availability of materials from different sources, and with policies involved in purchasing, handling and storing these materials, can be discussed safely for the most part. Whether the interested industrialists will be asked to discuss prices the government is warranted in paying for the various materials still is a moot point.

Plans of the board are to set up as few industry advisory committees as possible. At the start there probably will be 17 committees concerned with materials, and an additional 12 concerned with products made from these materials. The membership of these committees now being determined on the basis of nominations from the industries involved. Later on, as the board tackles other problems, additional committees will be organized. Among problems slated for discussion with industry committees are those involved in relocating key industrial plants, by dispersal and by utilizing underground locations, to minimize production losses from possible attacks by atomic bombs and by modern guided missiles.



CONTINUE WAR PROBE: Republicans won a major fight of the new Congress when the Senate voted 49 to 43 to continue the Special War Investigating Committee for another year. Leaders in the battle to continue the investigation, left to right: Sen. Homer Ferguson of Michigan; Sen. Owen J. Brewster of Maine; Sen. Joseph Ball of Minnesota; and Sen. William Knowland of California. NEA photo

Atomic Energy Papers Availabl

The first 270 atomic energy papers be declassified by the Atomic Energy Commission or by its predecessor the Manhattan Engineer District, now available to the public. They are described in a price list just issued by the Office of Technical Services, Commerce Department, Washington 25, D. C. In general, they are on a high scientific level and report on a wide variety of technical discoveries in mathematical, physical, engineering, chemical and medical fields under the general head of "nuclear physics." Many of them already have been read before technical and engineering associations, and many have been published in scientific and technical journals. Official Atomic Energy Commission documents have not yet been declassified and hence are not among the papers now offered by the OTS.

FTC Budget May Be Raised

If one of President Truman's min budget recommendations is approved Congress, the funds allocated to t Federal Trade Commission for the tra practice conference program will doubled. For the fiscal year ending Ju 30, 1948, $630,000 is asked. This co pares with $314,000 for this fiscal ye

The FTC now is working with 30 dustries on the establishment of tra practice rules; this is the heaviest lo on record insofar as the number of co under discussion is concerned. It also a heavy load for the reason that the n philosophy calls for more comp hensive and definitive rules than befo

For example, in holding conferen with the home dye industry—the ind try that makes dyes for sale to hou wives for use in the homes—there been a lot of talk about two terms t have been in use—"all-fabric" and " purpose" dyes. There has been object to the use of these terms, for the d

The CONE AUTOMATIC MACHINE COMPANY

sees many

GOOD THINGS AHEAD

t is reported that . . . . . .

Danielson Mfg. Co. of Danielon, Conn., is making a soft hamerhead of nylon that won't chip r bounce.

et ready with CONE for tomorrow

Windshield glass can be kept arm when coated with an electrially conductive transparent film alled "Nesa", manufactured by ittsburgh Plate Glass Co.

be ready with CONE for today

Eastman Kodak's process of olding small lenses in an atmoohere of nitrogen promises, when anufacturing technique is rened, to produce lenses satisfacory for all but the most critical ses.

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General Electric's new silicone aint is said to permit clearer, righter colors for automobiles, reigerators, electric ranges, etc., nd to "last a lifetime."

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Air Reduction Co. claims to ave perfected a method of flameutting stainless steel to close olerances at high speed without ffecting the physical properties of ne metal.

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American Cyanamid Co. has inalled hot water pipes under 600 et of roadway connecting its lant with the highway. The heat ill keep the road free from ice nd snow.

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The Mellon Institute has reorted on the use of ethylsilicate s a vehicle in paint. Finishes ade with it are said to resist heat, tard fire and not to darken with ge.

et ready with CONE for tomorrow

C. G. Conn Ltd. has an eleconic organ that produces its nes by vacuum tubes and is said be equivalent to an organ with 333 pipes.

Bell Aircraft Corp. is making a vending machine mechanism that makes change.

be ready with CONE for today

The Dobeckmun Co. of Cleveland is making an aluminum foil yarn, protected by a plastic surface from corrosion, for use in textiles in combination with other yarns.

get ready with CONE for tomorrow

Seal Peel Inc., of Detroit, is sending a shipment of various products, protected only by plastic dip coating, on a round-the-world flight to test the value of this type of packaging in actual service.

be ready with CONE for today

Dow Chemical Company's "Styrofoam" is a pure white cellular insulating material with only 18% of the weight of cork.

Atlas Supply Co., makers of tires and accessories, is showing its wares in a showroom built inside a DC4 and called the "Sky Merchant."

get ready with CONE for tomorrow

Linde Air Products Co. calls its method of flame-cutting rock (as for oil wells) "fusion-piercing." It is said to have drilled holes as deep as 450 feet at an average rate of 10 feet per hour.

be ready with CONE for today

The "Solexol cold fractionation" process developed by M. W. Kellog Co. is expected to be used in seven plants now building throughout the world. The process resembles that used for petroleum, but is applied to many basic oils and fats including soy bean, linseed, tallow, sardine and shark liver.

get ready with CONE for tomorrow

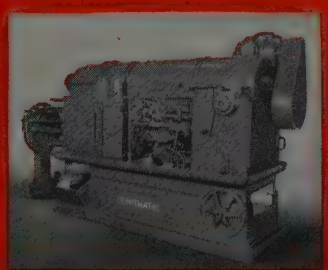
The R.C.A. electronic color television system will be made available to the entire industry.

FOLLOW THESE PAGES FOR NEWS OF PROGRESSIVE PRODUCTION

Impressively Conomatic!

This piece was produced from 2½" dia. S.A.E. 1114 in 13 tools in 12 seconds on a 2½" Eight Spindle Conomatic

Any good multiple spindle automatic should handle the ordinary run of work. But the *tough* jobs are profitable on Cones.



Ask your CONE *representative to show you our new color motion picture*

CONE

AUTOMATIC MACHINE CO., INC. ★ WINDSOR, VERMONT, U.S.A.

37

they cover do not serve equally well with all fabrics as a rule, and none of them serves as dyes for glass and metal fibers that constitute the newer fabrics. The final rules, to be set at a meeting with the industry in February, probably will permit these terms to be used provided the manufacturer states on his wrapper the exceptions to them.

Of the 30 industries with which the trade practice conference section of the FTC now is working, 28 opened the negotiations with applications to the commission. This is regarded as an unusual show of interest. The other two grew out of surveys which the FTC made to determine those industries that need trade practice rules to regulate competition. A considerable number of these surveys have been made or are under way, and during the coming months the FTC will invite many of the industries involved to trade practice conferences to the end that rules may be set up.

This idea of making surveys to discover the need for trade practice rules in different industries was first put into practice in 1946 under the new White House mandate to the FTC. Under this mandate the FTC is to "increase its effectiveness by operating on an industry-wide basis, rather than through the slower procedure of individual complaints." The idea is to sponsor a large number of industry conferences designed to locate and eliminate unfair trade practices through co-operative action.

In addition to developing trade conferences for industries that now do not have such trade practice rules, the FTC is actively working up closer liaison with the 156 industries that already have FTC-approved trade practice rules. The purpose is to hold occasional meetings to keep the rules alive and up-to-date and to head off violations.

Will Survey Steel Industry

Following a conference with a delegation representing the American Iron & Steel Institute, Commerce Department officials say they now will go ahead with their plans for a survey of the iron and steel industry. They hope to have their report ready for publication "late in March or early in April." They are uncommunicative as to what the report will show. They say, however, that the final pattern has not been frozen; some conferences still are to be held with steel consumers who are interested in the project.

Commerce, it will be recalled, prepared a survey of the iron and steel industry for the guidance of the Defense Plant Corp. in organizing the wartime iron and steel expansion program. Later this report was revised for the Senate Small Business Committee and made public by the latter. The present project, which was initiated following receipt of suggestions from the automobile industry and other consumers, was originally intended to contain much more information than the Senate committee report.

The new survey is under the direction of H. B. McCoy, director of the Office of Domestic Commerce, George W. Muller, chief of the Industry Division of the Office of Domestic Commerce, and Robert M. Weidenhammer, head of the Machinery and Metals Section, Industry Division.

Small Towns Offered Airport Aid

Producers of miscellaneous airport equipment will find best sales opportunities during 1947 in the smaller communities. To the small cities and towns will go all the money just allocated by the Civil Aeronautics Administration, under the Federal Airport Act, for aiding airport construction during the fiscal year ending June 30.

Noninclusion of large communities in the current allocations results from a provision in the act that the CAA must submit to Congress at least two months before the beginning of the fiscal year a list of the large projects to receive federal aid. Because the act was passed in May of 1946, there was not enough time to get such a list in prior to July 1, 1946. The CAA plans to make up this omission by allocating a proportionately larger share of the 1947-1948 appropriation to large airports.

The federal funds allocated for the current fiscal year come to $33,899,265. Local sponsors will provide an additional $37,692,600, so that the airport program to be launched this side of June 30 will involve direct expenditures of more than $70 million.

The program covers construction or improvement of 800 Class 1, 2 and 3 airports—those suitable for personal flying and local commercial use.

Auto Export Rules Relaxed

A general relaxation in the regulations governing the exportation of passenger cars, motor trucks, busses and bus chassis is announced by the Office of International Trade. New trucks, busses and bus chassis now are under general license and no longer will require validated licenses for export to any Group K country.

Applications for the exportation of used passenger cars for any purpose, including resale, will be approved "within reasonable limits, although a quantitative limitation and general control by country of destination must still be maintained.

An additional monthly quota of new passenger cars has been established to permit "limited" export for business or personal use where the vehicles will not be resold. Within this limited quota exports will be authorized without certification from the manufacturer.

An automobile may be exported as personal baggage under general license provided such vehicle has been in the exporter's possession for 60 days.

Trucks and passenger cars have been removed from the list of commodities excepted from the general in-transit license (GIT) procedure.

Outstanding Limited Production Licenses covering the exportation of new passenger cars produced during 1945 and 1946, and track-laying or wheeled tractors produced or shipped for export since June 30, 1946, have been extended through April 30, 1947.

Motor trucks have been removed from the Positive List of Commodities and placed under general license to Group K countries, but validated licenses are still required for exportation to Group E countries.

Names Mineral Advisory Group

A committee to advise Secretary of the Interior J. A. Krug of the mining industry's viewpoint with respect to national mineral policies has been named by the board of directors of the American Mining Congress, Julian D. Conover, AMC secretary, has announced. This committee was formed at the request of Mr. Krug when he addressed the fall meeting of AMC's Western Division.

Members of the advisory group are as follows, with their respective branches of the industry in parentheses: Howard L. Young, president, American Zinc Lead & Smelting Co., St. Louis, chairman; James D. Francis, president, Island Creek Coal Co., Huntington, W. Va. (coal); R. C. Allen, vice president, Oglebay Norton & Co., Cleveland, (iron ore); W. W. Lynch, Calumet & Hecla Consolidated Copper Co., New York, (copper); Edward H. Snyder, president, Combined Metals Reduction Co., Salt Lake City, Utah, (zinc); Andrew Fletcher, executive vice president, St. Joseph Lead Co., New York, (lead); Worthen Bradley, president, Bradley Mining Co., San Francisco, (other metals); H. M. [illegible] bright, vice president, United States Potash Co., New York, (nonmetallic minerals); and as alternates: Donald A. Callahan, president, Callahan Consolidated Mines Inc., Wallace, Idaho; and S. Williston, vice president, Cordero Mining Co., San Francisco.

lan Alterations n Republic Plant t South Chicago

Proposed installation of rod or bar mill to cost around $3.5 million one of several changes projected

REPUBLIC Steel Corp., which last cember was awarded the government-ned South Chicago (Ill.) steel plant for million, plans to alter extensively the ility which it operated for the govern-nt during the war and on an interim se since the end of hostilities.

Republic, according to its bid, proposes remove a 21-inch billet mill now lo-ed on its old property adjacent to that purchased and install it in line with 44-inch blooming mill which is part of new plant. To cost an estimated 75,000, this move will free Republic's building for additional finishing oper-ons. Republic also plans to install an-er rod or bar mill in the war-born fa-ties, to cost around $3,500,000.

The company in addition is giving seri-consideration to putting in several -ton or larger stationary open-hearth naces in substitution for a portion of electric furnace capacity provided for r requirements. Such furnaces could be constructed for less than $750,000 h, and their installation would depend the trend of steel operations in the Chicago area over the next year or two.

Aware of the increased demand for flat-rolled products in the market area which could be served from the Chicago plant, the corporation is also studying designs of mills which could best be fitted into the production schedules at the plant. Such an installation would represent so large a capital outlay, possibly as high as $25 million, that no definite commitments have yet been made for the expenditure of such a sum.

Existing producing facilities at the project will be utilized to a considerable extent. The coke plant and blooming mill will be used to their full capacity, while the blast furnace and bar mill will be operated at 75-80 per cent of capacity.

WAA Begins Sale of Surplus Worth About $3 Billion

About three billion dollars' worth of surplus capital and producer goods have gone on sale throughout the nation under War Assets Administration's "Second Operational Program" which began Feb. 1. Thirty-six national sales of capital and producer goods and 48 national sales of consumer goods will be launched through regional offices during the first few weeks of the four-month program.

Goods for sale include industrial power equipment, abrasives, bearings, cutting tools, metal forming and cutting equipment, iron and steel, valves and fittings, automotive parts, automotive machinery, hardware, plumbing and office machinery.

WAA Withdraws Acceptance of Bid for Foundry

Rescinds action in sale of government-owned plant at Bettendorf, Iowa, following disagreement on machinery

WAR Assets Administration has withdrawn its acceptance of the Bettendorf Co.'s purchase of the government-owned surplus steel foundry at Bettendorf, Iowa, operated during the war by Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., under name of Ordnance Steel Foundry Co. New bids will be taken.

Last September WAA announced that the Bettendorf Co.'s bid of $1,200,839, including $151,000 for raw materials in the plant, had been accepted. Following this it is understood the company and WAA disagreed over who should remove surplus machinery from the premises and the company sought to withdraw its bid. However, the matter was kept alive until the WAA announcement was made.

The WAA Washington office advised its Chicago regional office to "notify all previous bidders on the ordnance steel foundry facility at Bettendorf, Iowa, that the real property board had rescinded its previous action accepting the offer of the Bettendorf Co."

HUGE SURPLUS DETERIORATES: 20,000 army vehicles are rusting away at Ogden, Utah. Gen. Everett S. Hughes, Army Chief of Ordnance, states that he intends to suggest to War Department that equipment requirements be reviewed and material that can be dispensed with sold or junked. He indicates that lack of funds and facilities makes it impossible for the Ordnance Department to give proper maintenance to depots like this

New Records for Zinc Consumption Foreseen

Heavy backlog of demand for zinc-coated steel products gives promise that when steel and zinc supplies permit, usage of zinc for galvanizing will reach new levels. Postwar problems held 1946 consumption 7 per cent below that of 1945

A HEAVY backlog of orders for zinc-coated steel products, particularly galvanized roofing sheets, makes it appear likely that when steel and zinc supplies permit, consumption of zinc for galvanizing will be record-breaking.

In 1946, galvanizing again was the leading user of zinc, on the basis of total tonnage consumed, the 1946 use of zinc for that purpose being estimated by Ernest V. Gent, secretary, American Zinc Institute Inc., New York, as 325,000 tons of the year's estimated total U. S. slab zinc consumption of 793,000 tons. That consumption for galvanizing was slightly less than the 337,181 tons of 1945, but the decline was due to the shortage of steel rather than a shortage of zinc, Mr. Gent pointed out. Another factor contributing to the decline, he suggested, was the holding of zinc-coated steel products for so long at government price ceilings, which, he said, were out of line and made those products less profitable in comparison with other outlets for steel.

Use in Brass Declines

Off sharply in 1946, and lower than at any time since 1938, was the volume of zinc used in brass. The drop to an estimated 150,000 tons in 1946, compared with 259,377 tons in 1945, resulted from labor troubles at the brass mills, the increased use of brass scrap which displaced virgin metal, and the changeover from munitions to peacetime products. If the copper supply is sufficient, increased calls for zinc for brass products may be expected, Mr. Gent said.

Zinc for diecastings reached an all-time peak. The estimated consumption of slab zinc for zinc-base alloys rose to approximately 200,000 tons, and it was pointed out by Mr. Gent that a substantial increase in automobile production would put a heavy burden upon the zinc industry to supply the special high grade zinc that would be needed.

Rolled zinc accounted for consumption in 1946 of approximately 93,000 tons of slab, compared with 91,589 tons in 1945. However, the 1946 figure was far ahead of either 1943 or 1944.

Other uses of zinc brought the total estimated slab zinc consumption in 1946 to 793,000 tons, a 7 per cent decrease from 1945.

Production of slab zinc in 1946 by producers in the American Zinc Institute was 40,000 tons less than in 1945, but, said Mr. Gent, considering strikes, labor shortage, and price control policies it is remarkable that 1946 did not show a greater loss. Output of those producers in 1946 was 759,212 tons, compared with 799,520 in 1945.

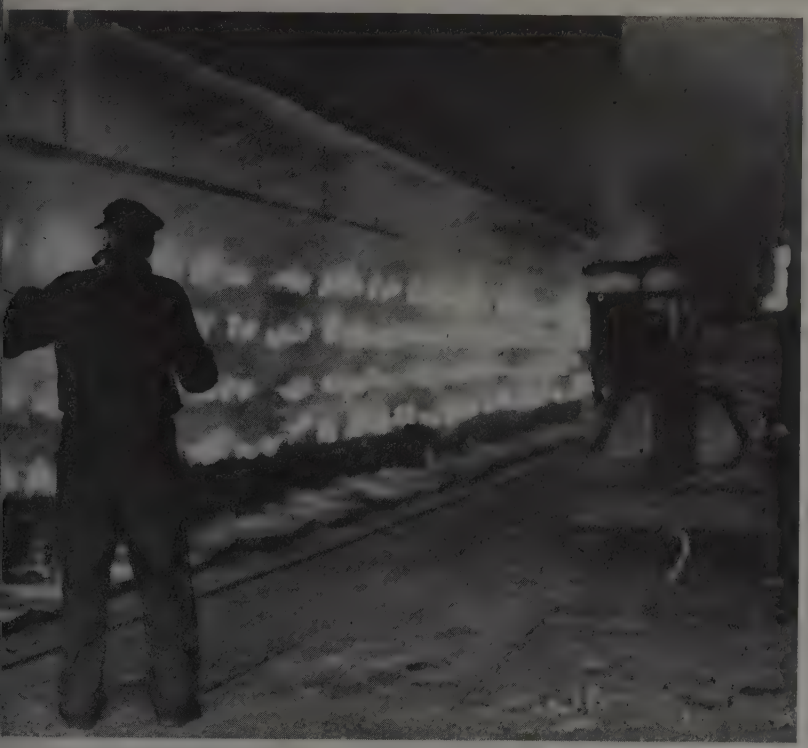
Total slab zinc shipped from smelters in 1946 including shipments for domestic consumption, exports and drawback, and for government account was 842,275 tons, 8 per cent above the 777,649 tons which moved in the previous year and about equal to the 1944 total. Stocks at Dec. 31, 1946, were 176,328 tons in comparison with 259,391 tons held on Jan. 1 that year. Thus, 83,063 tons were withdrawn that year to supplement current production and imports. Stocks held at smelters at the end of the year were largely owned by the Reconstruction Finance Corp. This tonnage consists principally of ordinary high grade zinc. If the spread between domestic and foreign ore and metal is such as to enable smelters in the United States to operate with a fair return, production of slab zinc is likely to continue at a good rate as long as the demand justifies it, Mr. Gent said. He added that slab zinc imports will continue to supplement domestic production as long as the relative price in the United States and abroad permits it and consumption warrants it.

In the first quarter, total deliveries matched production, but as production fell, shipments increased and stocks were drawn upon. Except for a decline in deliveries in August this trend continued to the end of the year. After a lapse of two years, and because of higher price levels abroad, the volume of exports again became of real significance, Mr. Gent pointed out. Export and drawback tonnage in 1946 rose to 66,638 compared with only 9422 in 1945. Shipments for government account in 1946 were also substantial, totaling 62,007 tons, compared with 5302 in 1945.

On the basis of overall figures, the available supply and the requirements for slab zinc were substantially in balance, Mr. Gent said. The supply includes current domestic production and imports plus withdrawals from stocks, including those government-owned. While this balance exists in the overall picture, conditions have prevented such a balance in all grades, Mr. Gent pointed out. There has been a shortage of prime western, the principal grade used for galvanizing. If the relationship between the domestic and foreign prices had permitted, it is reasonable to assume, Mr. Gent asserted, that imports of prime western zinc would have continued and gone a long way to make up any deficiency in this particular grade. However, a substitution of higher grades which were available made the situation far less acute than it might have been.

Tightness in the special high grade supply has been much more difficult to solve. The sharp increase in consumption for alloy diecastings enlarged the problem, the 1946 use representing a 53 per cent increase over 1945 and 138 per cent increase over 1939. Here again, if prices in the United States and the world market had been more in line, imports during this period of extraordinary demand might have been maintained at a higher level, Mr. Gent declared.

Final figures are expected to show that slab zinc imports in 1946 approxi-



One of the many steps in providing zinc for industry is pictured here. At a zinc furnace of the Donora, Pa., Zinc Works of the American Steel & Wire Co., a United States Steel Corp. subsidiary, a mixture of zinc ore and finely crushed coal and coke is reduced to a free metal by distillation. The workman is "venting" a condenser to allow gas to escape

nately equaled the 1945 imports of 97,114 tons and that zinc ore imports were substantially below the 1945 receipts of 381,716 tons. While the slab zinc tonnage from Canada shows a substantial increase, Mexican shipments will likely be less than half of 1945. Mr. Gent said it is interesting to note the changes in sources and volume since the peak of ore imports in 1943. Mexico continues as the chief country of origin, with Canada second in importance. Australia, a very large shipper in 1943, was the smallest in 1946.

As to 1947, imports will depend upon metal consumption in the United States, the tariff, and subsidy payments. Both slab zinc and zinc ore are included among the import items as subject to duty reductions in reciprocal trade agreement negotiations.

Mine production of recoverable zinc in 1946 dropped to 565,787 tons, according to preliminary figures from the U. S. Bureau of Mines. In 1945, the output was 611,998 tons.

Premium Price Plan for Copper, Lead, Zinc Revised

To prevent undue diversion of premium money into royalty payments, regulations covering the government's premium price plan for copper, lead and zinc have been revised.

Under the revised regulations the Office of the Premium Price Plan will not approve a royalty rate for any operation which exceeds the rate prevailing on Nov. 10, 1946, when Maximum Price Regulation 356, which governed royalty rates, was revoked.

The revised regulations have been formalized in Stabilization Directive 146.

Recommendation Made on Interim Allocations of Tin

Recommendation that interim allocations of tin metal for the first half of 1947 be set at approximately 50 per cent of allocations recommended for the last half of 1946 has been made by the Combined Tin Committee.

This recommendation of an interim allocation was made to keep supplies moving until more information on supply can be obtained. Later, additional quantities of tin will be available for allocation during the first half of the year.

Total interim allocations, which do not include domestic production, are 10,915 long tons, with 3640 of them for the United States.

Asks Repeal of Excise Tax on Copper Imports

Issue precipitates debate between fabricators and domestic producers. Consumers fear serious shortage

AMONG the latest appeals for action to abolish the 4-cents-a-pound excise tax on copper imported into the United States is one from a copper fabricator, the Scovill Mfg. Co., Waterbury, Conn.

Expressing the belief that a serious copper shortage threatens the United States, the Scovill company urged Congress be requested to seek immediate repeal of the import excise tax.

In recent months there has been considerable debate over the tax, with statements being issued by both proponents and opponents of it. The tax was put into effect in 1932 to protect domestic producers during the depths of the depression.

In helping augment the country's wartime supplies by purchasing foreign copper, the federal government through the Metals Reserve Co. of the Reconstruction Finance Corp. has for the last several years been waiving the tax on all foreign copper it has purchased for allocation to consumers.

Deliveries of copper by the Metals Reserve Co. will terminate at the end of February because it ceased purchasing copper when government price ceilings were abolished on Nov. 11, 1946, and the forward contracts in existence then will be completed by Mar. 1, the Scovill Mfg. Co. pointed out.

While government price ceilings were in effect, private purchase of copper from foreign areas was not feasible because the controlled domestic price was substantially below the world price. However, with elimination of government price ceilings and the rise of the domestic prices to equal or exceed foreign prices it became unnecessary for the government to continue buying foreign copper, government officials said.

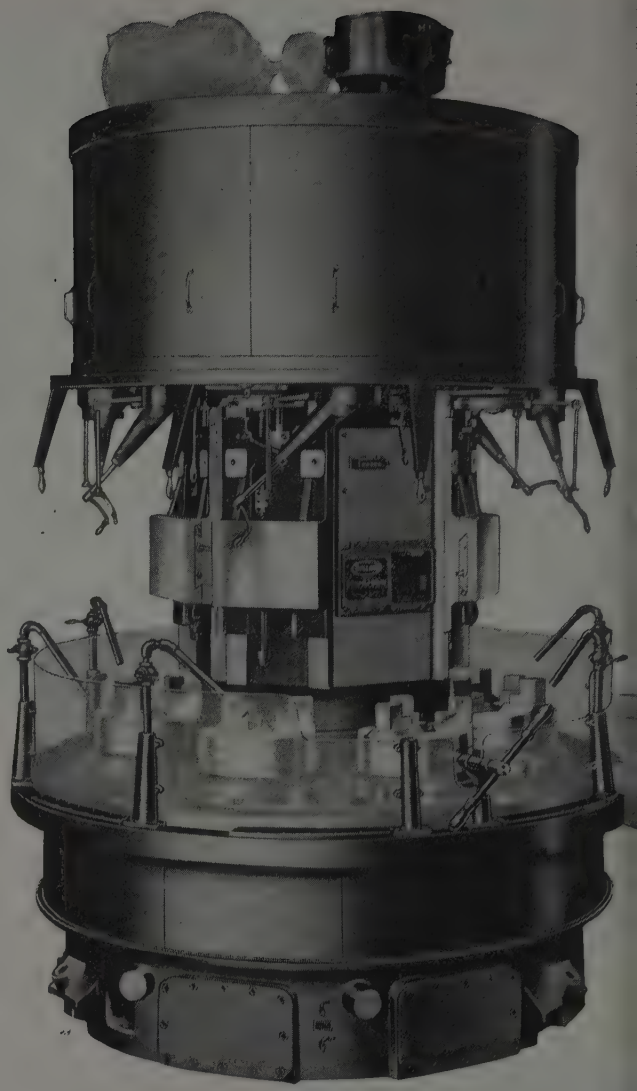
Heavy demand for copper and high domestic prices are now turning private companies and individuals to foreign sources for copper, and with the domestic price above the foreign price the 4-cent tax would have to be collected for the first time since June, 1932.

This has precipitated considerable de-

(*Please turn to Page* 189)

A Special-Purpose Machine for Long Runs

A Versatile Machine for Diversified Schedules



A MULT-AU-MATIC IS BOTH

Bullard Type D MULT-AU-MATICS are made with 6 or 8 spindles in 4 sizes for work up to 23" diameter.

Many Bullard Mult-Au-Matic users tool them up and let them run on the same job for years. No other machine has such an outstanding production record on high-speed, heavy-feed, tough-metal, continuous operation.

Other Bullard Mult-Au-Matic users find short runs profitable because change-over from one type of work is relatively simple. That's because the Universal, Convertible Double-Purpose and Auxiliary heads are quickly and easily set up for new operations. Moreover, each tool head has 82 independent feed rates... and each spindle has 41 independent speeds. *Bullard Engineering Service can help you simplify your retooling requirements.*

Complete data describing the ability of Mult-Au-Matics to make long runs and diversified schedules profitable are contained in Bulletin MAM-D7-6-45.

The Bullard Company, Bridgeport 2, Connecticut.

BULLARD

CREATES *NEW METHODS* TO MAKE MACHINES DO MORE

A. H. ALLEN *Detroit Editor, STEEL*

Mirrors of Motordom

Automobile output pushing toward new postwar high. January assemblies to approximate 360,000 cars and trucks, slightly under December production. Schedules call for lifting output to about 450,000 units by April

DETROIT

BARRING some unlooked-for hitches, h as the possible shutting off of seat hion springs from a strikebound L. A. ing plant here, automobile builders week were expected to push assem- s of cars and trucks across the 100,- -mark for the first time since the week ling July 26, 1941, when the total 105,635. Highest weekly total ched by the industry in the past ten rs was 150,485 for the week ending y 1, 1937.

Going still further back into history the banner year of 1929, weekly duction eclipsed the 150,000 level y in the four consecutive weeks from ril 20 through May 18. Thus, in 18 rs there have been only five weeks en more than 150,000 cars and trucks re produced, so these periods must be sidered exceptional and not repre- tative of peak capacity. If assemblies s year attain a level of 135,000 ekly, they will have reached a normal k, and there is obviously still some tance to go.

Model Changeovers Affect Total

January assemblies should approximate 0,000 cars and trucks, on a 65-35 sis, compared with 381,000 in De- nber. The 5 per cent reduction reflects minimum amount of time required for del changeovers in General Motors isions which have caught up the mpo of late 1946 in remarkably good hion. With 21 working days, January ows average daily output of 17,190. is should be boosted slightly during current month which has only 19 rking days and, hence, probably will count for around the same total as nuary.

Since last August, car and truck assem- es have been holding in the 350,000- 0,000 range monthly and efforts are ing made to step this up in April to 0,000. If they are successful then the -month period from August, 1946, ould show a production total of well er the 5,000,000 mark. Loud wails the contrary over recurring material ortages—lack of steel, insufficient cast- gs, not enough copper, too few storage tteries, no tin, etc.—this will be a sig- l postwar achievement in the making which suppliers of materials and parts have come to bat in a resounding way.

Probably at no time in the past ten years has the automobile scene appeared as bright and full of hope as at the moment. Prospects of labor unrest are diminishing, with the UAW-CIO apparently steered on a course of statesmanlike collective bargaining, agreeable to extension of expiring contracts and disinclined toward the sword-brandishing conduct of the past. This tranquil outlook could be a smokescreen thrown up in the effort to head off too-restrictive union legislation in Washington, or it could mark distinct progress in improving relations between unions and management.

Ford's industrial relations chief, John S. Bugas, takes an encouraging view of the company's experience over the past year with its UAW contract. For example, in 1945 there were 131 work stoppages resulting in a loss of 767,000 man-hours, but last year there were only 23 work stoppages and only 81,253 man-hours lost. In contrast, national figures show a different picture—4570 work stoppages in 1945 and 4700 in 1946, 38,000,000 man-days lost in 1945 and 113,000,000 in 1946.

The improvement at Ford is not traced solely to the so-called "company security" provisions of the union contract. A material strengthening and reshuffling of the company's industrial relations department may have been an important contributing factor. A sharp decrease in grievance problems has been noticed— second-stage grievances have dropped 50 per cent and the soundness and efficiency of grievance procedures have been improved, reducing the load of decisions which move to the impartial umpire for resolution.

Bugas feels we are entering a period of great progress in the field of labor management relations. The gradual shift from the unhealthy atmosphere of a sellers' market to the wholesome discipline of normal competition for the consumer's dollar will have a salutary effect on both labor and management, he believes, by putting a premium on intelligence, understanding, efficiency and united action.

Recognition of mutuality of interest on the part of both labor and management is basic to good relations. The younger Henry Ford has been greatly interested in exploring the attitudes and sentiments of his employees and thus to interpret the working force to the management in the interest of furthering appreciation of mutual interest in the business of building motor cars. He has sent three personal letters and a questionnaire to all his employees, seeking their frank criticisms and opinions. The first two letters drew several hundred replies from the 121,000 to whom they were sent. About 23,000 of the questionnaires were returned and about 90 per cent of them felt the approach had some values.

Automobile Production

Passenger Cars and Trucks—U. S. and Canada

Estimates by Ward's Automotive Reports

	1946	1941
January	121,934	524,073
February	84,141	509,332
March	140,777	533,878
April	248,318	489,856
May	247,620	545,355
June	216,637	546,278
July	331,000	468,897
August	359,101	164,793
September	342,727	248,751
October	410,466	401,369
November	380,460	373,892
December	380,908*	302,518
Total, 12 mos.	3,264,089*	5,108,992

Estimates for week ended:

	1947	1946
Jan. 11	64,828	23,340
Jan. 18	75,166	28,485
Jan. 25	94,345	29,410
Feb. 1	100,000	29,295

* *Preliminary.*

Attention Turned to 48 Models

With most of the 1947 passenger car models reflecting little more than fresh lipstick and face powder, conversation is turning to what may be in store for the 1948 versions, probably to appear this fall. In the case of General Motors, it appears at this stage that new bodies will be introduced only on the larger models in the Cadillac, Buick, Olds and Pontiac series. Cancellation of the entire so-called "A" body program suggests the smaller Chevrolet, Olds and Pontiac will continue with present bodies, probably extensively retrimmed but essentially the same contours. The "B" and "C" bodies are now moving through the experimental stages and are going to embody

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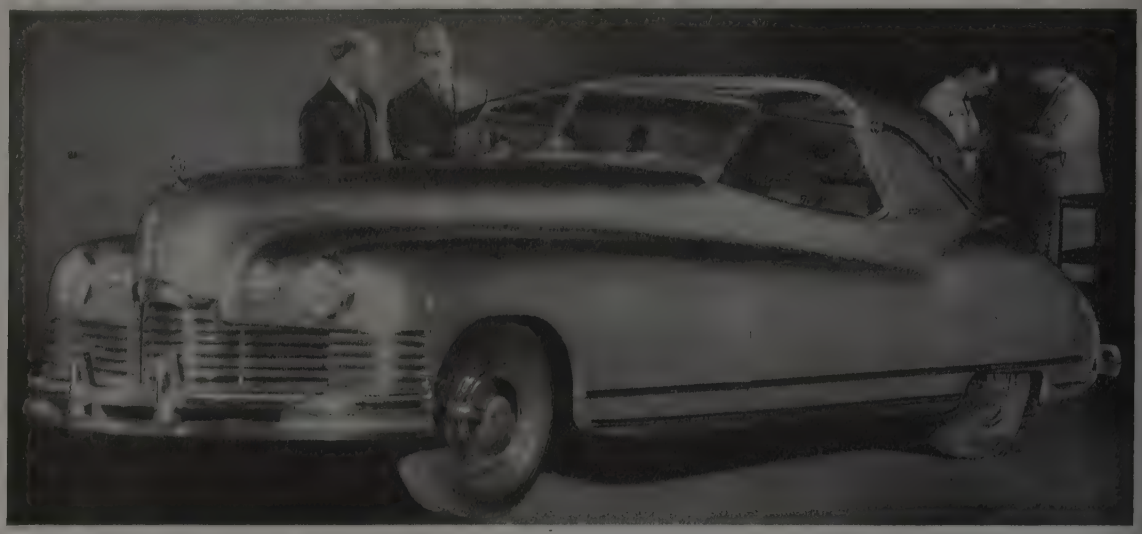


STYLING LABORATORY: This is not a postwar dream car, despite the transparent roof and striking design. Actually it was created more than six years ago by Edward Macauley, head of the Packard Motor Car Co.'s styling division, as a mobile testing laboratory. In this picture, Macauley, second from left, discusses a new styling trick with E. A. Weiss, Packard chassis and advance design engineer

several inches more width, still wider doors on two-door styles and better visions both front and rear.

As to engines, the possibility is seen of new power plants for both Buick and Oldsmobile, perhaps not in all models but likely in the deluxe types. Tooling for an entirely new engine is a costly procedure, particularly under today's rates for tool, die, jig and fixture work, so changes will be gradual and will not be extended to the high-volume models until they have been proved thoroughly.

New Braking Developments

New developments in the field of braking should be unveiled in 1948 models of some of the Ford and Chrysler lines. Kelsey-Hayes has developed a new type of power brake which will be built in its French & Hecht Division plant, and it is understood already to have been approved for use on the Chrysler Imperial and possibly for Lincoln. Air brakes and servo booster brakes are common in the bus and truck field, but their cost has kept them off passenger cars. Simplified and less expensive systems should prove to be valuable plus items at least in luxury-type cars and eventually in all passenger cars. Effortless brake pedal operation will be welcomed by many drivers, even though present systems may not induce much actual fatigue.

Releases Out for Station Wagons

Orders for materials and parts have been placed by Fisher Body Division for a lot of 1800 station wagon bodies to be built at Fisher plant in Cleveland for Chevrolet. These wood units previously have been purchased from an outside builder, and decision for Fisher Body to undertake their construction was prompted by the availability of manufacturing space and equipment in the Cleveland Coit Road plant. Chevrolet and Pontiac station wagon bodies heretofore have been supplied by Ypsilanti Reed Furniture Co., Ionia, Mich. Incidentally, station wagons and convertibles for Pontiac, Olds, Buick and Cadillac, representing only a little over 2 per cent of GM's total passenger car output based on 1946 volume, have been raised in price as much as $193.

Weight in Right Places

Active for over 20 years in the design and development of motor cars lighter in weight than those common in the U. S., Walter D. Appel, chief engineer of Willys-Overland, presented some interesting tabulations on the weight patterns of 13 English, German and American cars, weighing between 1500 and 3300 pounds, in a paper before the Society of Automotive Engineers here last month. He prefaced his remarks by pointing out there is no particular magic about making a car light. It can be done simply by leaving things off and using thinner sections. However, the real technique comes in making the car light and at the same time of acceptable appearance with proper performance, satisfactory road handling characteristics and adequat durability. Certainly in this country least the vehicle must not be sma to the extent of inviting ridicule or crowding the passengers.

Summing up what the properly d signed light car really is, Appel said is one in which all material has be taken from the wrong place and put the right place—economically, comme cially and technically. For instance, hig priced material is in the right pla economically if, only through its us the necessary life factor or commerci result can be obtained.

Material is in the right place com mercially when it contributes to the sa of the product, he said, and it is in t right place technically when it contribut to the mechanism's successful operatio

Tinnerman Licenses Shakeproo

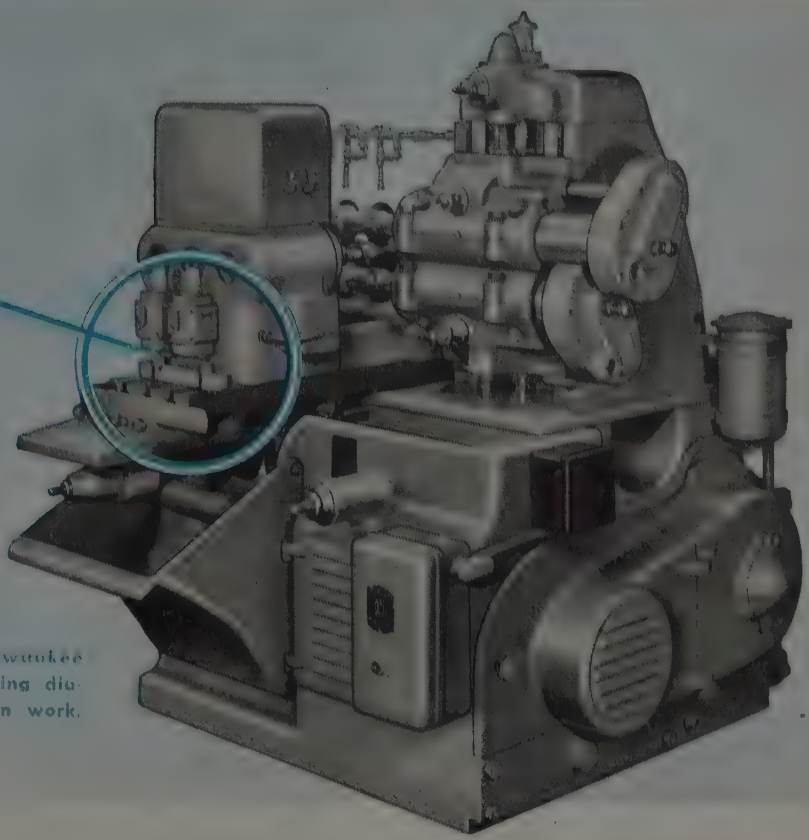
Tinnerman Products Inc., Clevelan has licensed Shakeproof Inc., division Illinois Tool Works, Chicago, to manu facture and market Speed Nuts and Spe Clips on which Tinnerman holds t patents. Classifications covered inclu U-type, J-type and latching-type faste ers.

The reasons for this move, accordi to George A. Tinnerman, vice preside and general manager, were a steadi increasing usage of Speed Nuts and Spe Clips and the desire to provide a consta and adequate supply. Shakeproof will into production during the current qua ter.

VICKERS HYDRAULIC CONTROLS

Simplify Machine Operation... *Protect* Work and Machine

Vickers Hydraulic Sequence and Check Valve.



Kearney & Trecker Milwaukee Simplex for multiple milling diametrically opposite slots in work.

his is one of a series of applications pointing ut the many advantages of Vickers Hydraulic Controls.

is is a representative installation of Vickers Hydraulic ontrols featuring interlocking of machine operating ases by a combination of pilot interlocks and pressure quence control valving. Three work arbors are indexed position for simultaneous slot milling . . . accurate register d timing being assured by series connected pilot and essure sequence interlocks. Thus all three pieces are in oper position before cutters approach the work. The same positive interlocking prevents succeeding automatic index until cutters are clear.

Other advantages of these valves: (1) they automatically provide "cushioned" operation, and (2) their ease of adjustment saves set up time when a variety of types of work is to be accommodated.

Our application engineers will be glad to discuss adaptations of Vickers Hydraulic Controls to your products.

New BULLETIN

Bulletin 45-34 on Vickers Pressure Control Valves includes operation, typical applications and installation of unloading, sequence, overload relief and counterbalance valves.

VICKERS Incorporated

1480 OAKMAN BLVD. • DETROIT 32, MICH.

Application Engineering Offices: ATLANTA • CHICAGO • CINCINNATI • CLEVELAND • DETROIT LOS ANGELES • NEWARK • PHILADELPHIA • ROCHESTER • ROCKFORD • SEATTLE • TULSA • WORCESTER

National Carbon Completes New Vermont Plant

Flashlight case plant, containing 80,000 sq ft of manufacturing floor space, to hold open house Feb. 5-6

OPEN HOUSE at National Carbon Co. Inc.'s new $2 million plant at St. Albans, Vt., will be held Feb. 5 and 6 to permit public inspection of New England's newest industrial facility. The plant, which was constructed for the large-scale production of Eveready flashlight cases, will begin operations immediately and when in full production will employ approximately 400 workers.

The new plant consists of several one-story buildings located on a 56-acre tract. Included are a main manufacturing building containing 80,000 sq ft of floor space, an office building with 6400 sq ft of space, a boiler house, garage, and oil and solvent building. It was built for National Carbon by Gillmore-Carmichael-Olson Co., Cleveland.

Other plants of National Carbon Co., which is a unit of Union Carbide & Carbon Corp., New York, are located at Bennington, Vt.; Cleveland, Fremont and Fostoria, O.; Charlotte, Asheboro and Greenville, N. C.; Niagara Falls, N. Y.; Clarksburg, W. Va.; and Columbia, Tenn.

RUSTPROOFING FOR BRITAIN: A. J. Dawson, left, chief electrical engineer of Albright & Wilson Ltd., manufacturing chemists of Oldbury, England, looks into new rustproofing chemical for steel, called Bannox and developed by Calgon Inc., Pittsburgh. Albright & Wilson have been the British manufacturers for Calgon for many years and is the only firm in England to make phosphorus. Mr. Dawson and C. T. Roland, Calgon chemist and engineer, are inspecting steel slides coated with various materials and tested in salt-fog conversion bath

Niles-Bement-Pond Honors 687 Long-Service Employees

In ceremonies which had to be conducted in two sections, Niles-Bement-Pond Co., West Hartford, Conn., recently honored 687 employees who had from five to 50 years of continuous service with the company.

Thomas Maroney had the longest record with 50 years of service. There were four with 40 years; 21 had worked 30 years; 41 had served 20 years; 139 had been with the firm ten years; and 497 had five-year records.

Crane Co. Is Negotiating To Purchase Allianceware Inc.

A proposal from Crane Co., Chicago, manufacturer of valves, fittings and plumbing fixtures, to acquire the property and business of Allianceware Inc., Alliance, O., will be voted on by the latter's stockholders Feb. 4. If the transaction is made, the Allianceware business will continue to be operated by its present executives and personnel as a division of Crane Co. Present products include porcelain-enameled steel bathtubs, lavatories and sinks.

Cleveland Chain Purchases Chain Works in New Jersey

Purchase of Woodhouse Chain Works, Trenton, N. J., by Cleveland Chain & Mfg. Co., Cleveland, has been announced. The Trenton plant will continue in full operation as the Woodhouse Chain Works Division of Cleveland Chain & Mfg. Co. E. S. Washburn, present plant manager, will remain in the same capacity under the new setup.

Keystone Steel Purchases Own Stock for Retirement

Purchase of 183,902 shares of stock of the Keystone Steel & Wire Co., Peoria, Ill., by that company and its subsidiary, National Lock Co., Rockford, Ill., has been announced by attorneys of the companies and the owners of the stock, the Forest Park Home Foundation and W. H. Sommer. Total cash consideration is $7,356,080, with the terms of the sale subject to the approval of Keystone stockholders, who will act on the proposal at a special meeting Feb. 21.

In the transaction, Keystone will acquire 142,632 shares of the stock, which, according to R. E. Sommer, president of Keystone, will be placed in the company's treasury for retirement. National Lock will purchase the remaining stock.

The transaction, it was pointed out, will reduce the earned surplus account of the Keystone company, but at the same time the company's stockholders will increase their participation in the company's earnings by approximately 2 per cent.

Plan To Improve Wickwire Spencer Steel Div. Plant

Improvements costing from $700,000 to $1 million will be made in the Wickwire Spencer Steel Division's Tonawanda River Road plant in Buffalo. The division, with Carl W. Meyers as president, is a unit of Colorado Fuel & Iron Corp. Alterations will include changes in the boiler house, a new gas house, new wire-drawing equipment and a new annealing furnace.

RIEFS . . . .

Paragraph mentions of developments of interest and significance within the metalworking industry

orthwestern Steel Co., New York, ehouse steel distributor, has opened a burgh office at 100 Sandusky St. er the management of Ray D. Cope-, formerly associated with Bethlehem l Co. in a similar capacity as district chasing agent.

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uria Bros. & Co. Inc., Reading, Pa., opened a branch office at 1507 Gen- Bldg., Buffalo, with Terry Hanlon as rict manager. Mr. Hanlon was for- ly associated with Summer & Co., umbus, O.

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astern Stainless Steel Corp., Balti- e, is completing its expansion pro- n initiated over a year ago and de- ed to more than double the plant's inal capacity.

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inde Air Products Co., New York, of Union Carbide & Carbon Corp., s construction of a new oxygen filling ion and acetylene producing plant in son, Miss.

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usiness Information Bureau, Cleve- l Public Library, has issued a list of ufacturing directories published for n of the states and for Alaska.

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rmour & Co., Chicago, has estab- ed a fund of $12,000 for a graduate arch program at Massachusetts Insti- of Technology for study of mineral tion. Professor A. M. Gaudin of the itute's department of metallurgy will ct the program.

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ennessee Coal, Iron & Railroad Co., ningham, unit of United States Steel p., has awarded certificates to 110 ployees in recognition of long service.

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Monarch Machine Tool Co., Sidney, has transferred its eastern sales of- from Newark, N. J., to New York, 3 Empire State Bldg.

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heem Mfg. Co., Baltimore, plans to plete its present expansion program Sparrows Point by the middle of the r—a program started more than a r ago and which will double present duction, with some 75,000 sq ft being ed.

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V. S. Rockwell Co., New York, has ived an order for one pusher-type et furnace, two continuous plate re- heating furnaces and one continuous sheet annealing furnace for installation in a large new brass and copper mill in India.

—o—

DeVilbiss Co., Toledo, O., is conducting one-week courses in spray painting for industrial finishers. Remaining sessions start Mar. 10, May 12 and June 23.

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Pittsburgh Plate Glass Co., Pittsburgh, announces construction of a $1 million factory at Long Branch, Ont., Canada, to produce paint, varnish and enamel products.

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Portsmouth Steel Co., Portsmouth, O., plans major expansion of its wire department. To be housed in several new buildings, the department proposes production of oil tempered spring wire, industrial cloth, and other products.

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Metallurgical Engineers Inc., Portland, Oreg., newly formed, plans to provide services in design and development of metal products and processes for manufacturers in the Pacific Northwest.

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United States Air Compressor Co., Cleveland, manufacturer of automotive service equipment, will expand its line of products with addition of a department for manufacture of hose coupling and fittings, air valves and blow and spray guns.

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Aluminum Co. of America, Pittsburgh, has produced four films available for both 16 mm. and 35 mm. sound movie projectors. They deal with brazing and torch, arc and resistance welding.

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Chemical Department, Pittsfield, Mass., General Electric Co., has established a Plastics Division and a Compound Division in place of the former Plastics Divisions. George P. Lehmann will be manager of the plastics section and John L. McMurphy manager of the compound.

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Mathieson Alkali Works, New York, has leased the government ammonia plant at Lake Charles, La. It is a long term agreement with option to purchase. Unoccupied since late 1945, the plant will require four months of preparation before it can be operated.

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Horace T. Potts Co., Philadelphia, iron and steel jobber, has celebrated its 132nd anniversary. Present members of the firm are of the fourth and fifth generations since the founder.

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United Precision Products Co., gage manufacturer, has moved its Chicago office and factory to Shabbona, Ill.

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Alabama State Chamber of Commerce has issued a new industrial directory for the state, listing 3502 industries with 250,000 workers. The first book in 1941 recorded 1988 industries employing 150,000 people.

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United States Rubber Co., New York, is producing a rubber hose for a noiseless riveting hammer at its Passaic, N. J., plant.

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Buflovak Equipment Division, Buffalo, Blaw-Knox Co., has developed a stainless-steel evaporator that concentrates 3500 gallons of tomato juice an hour for use in ketchup and other tomato products.

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Coons & Fuchs Inc., Buffalo, metal fabricator, has acquired the former Seneca Battery Corp. plant in Sloan, N. Y., a Buffalo suburb, for around $50,000. The plant was operated by the U. S. Army during the war under lease from Seneca Battery Corp.

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Refrigeration Equipment Manufacturers Association, Chicago, announces a policy of national refrigeration and air conditioning expositions, centering around the holding of one all-industry show every two years, beginning in January, 1948.

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Plastics Division, Springfield, Mass., Monsanto Chemical Co., has under construction a plant for production of wood flour, key ingredient for phenolic-type plastics. The three-building facility is expected to be in production by May 1.

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Oltman-O'Neil Co., Detroit, is producing steel truck bodies at a rate of 5000 annually after less than one year's operation. Included in current production is a line of octagonal wheel housing van bodies which lower the floor level and overall height by nine inches.

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Leeds & Northrup Co., Philadelphia, maker of electrical instruments and heat treating furnaces, has been given the first annual Industrial Relations Award of the Chamber of Commerce and Board of Trade.

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Bailey Meter Co., Cleveland, will add 14 men to its field force after they have completed their present course in instrumentation at the Bailey factory.

West Coast Buyers Seen Using More Caution in Buying for Inventories

Price uncertainty and better supplies of many materials seen as reasons for less extravagant buying. Continuing steel shortage expected to distort inventory positions and production schedules

SAN FRANCISCO

MANY West Coast manufacturers are beginning to tighten controls on their inventories of raw materials. Frequently this policy is based on anticipation of declining prices for many materials. In other cases corporations are showing increased caution because of price uncertainties. In addition, prospects are improving steadily for increased supplies of many materials, relieving manufacturers of the necessity of ordering blindly far in advance.

One producer of heavy industrial equipment in this area has been buying materials only as needed, gearing purchases to the production line as closely as possible. Inventories of this firm have been reduced about a half a million dollars in the last year.

Another company here which uses large amounts of copper and brass bought heavily of those materials prior to the recent price advance. At present the policy is to restrict ordering and to slow down on inventory accumulations until price uncertainties are resolved.

Order Cancellations Feared

A number of corporations are carrying considerably larger inventories than normal because they feel they are protected by large order backlogs for their finished products. In some cases, however, firms are beginning to fear cancellations of orders which will leave their inventory positions unbalanced. One West Coast machinery maker has started to curtail inventories because of this possibility.

Inventory controls still are affected widely by availability of materials. Continuing scarcity of some items and increasing supplies of others still distort both inventory positions and production schedules. In addition, controls are affected by types of materials used. For instance, fabricators whose principal raw material is steel still are affected widely by the shortage of steel, and they do not expect supplies to become more liberal for several months. As a result they see little likelihood of price reductions on steel and, thus, are ordering liberally.

Reports from Geneva, Utah, indicate that production of the Geneva Steel Co., subsidiary of U. S. Steel Corp., is being restricted by a shortage of ore cars. Although the company has obtained 250 coal cars from Pittsburgh, which have served to relieve a similar shortage of equipment in the coal-hauling operation, no relief has been found for alleviating the ore-car bottleneck.

As a result of restricted ore movements, the plant currently is operating only two of its three blast furnaces and only five of the nine open hearths. The structural and plate mills are working only two shifts daily, five days a week.

Ford May Let Subcontracts For Parts on West Coast

Approximately 2000 parts for Ford and Mercury cars will be displayed in Los Angeles and San Francisco during this month, at which time Ford Motor Co. purchasing agents will ask West Coast fabricators to bid on contracts for manufacturing the various parts displayed. Ferrous and nonferrous metal parts and plastic and rubber parts will be exhibited.

It is understood that the demonstrations are the first stage of a program in which the Ford company may eventually subcontract for a substantial share of its assembly parts on the Coast. With respect to Mercury parts, it is said that 22 per cent of the parts necessary for manufacture of the car may be made in the area.

Two New Chapters of AFA Formed in Western States

Organization recently of two new chapters of the American Foundrymen's Association has been announced by W. W. Maloney, AFA secretary-treasurer. The Rocky Mountain Empire chapter, with headquarters in Denver, will be open to foundrymen and representatives of allied trades in Colorado, Utah, Wyoming, New Mexico, western Kansas, southwestern Nebraska, northwestern Texas and western Oklahoma. The Tri-State chapter, with headquarters in Tulsa, Okla., will serve the region bounded by McAlester, Okla., on the south, Oklahoma City, Enid and Blackwell, Okla., on the west, Wichita, Coffeyville and Pittsburg, Kans., on the north and Webb City and Joplin, Mo., on the east.

Officers of the Denver chapter are: J. L. Higson, partner, Western Foundry, Denver, chairman; W. R. Manske, works manager, American Manganese Steel Division, Denver, American Brake Shoe Co., vice chairman; C. E. Stull, manager, Manufacturers Foundry Corp., Denver, secretary; and J. W. Horner, vice president, Slack-Horner Brass Mfg. Co., Denver, treasurer.

Officers of the Tulsa chapter are: R. W. Trimble, Bethlehem Supply Co., Tulsa, chairman; Anton Johnson, Oklahoma Steel Casting Co., Tulsa, vice chairman; C. A. McNamara Jr., Big Four Foundry Co. Inc., Tulsa, secretary; and Frank G. Lister, Chicago Pneumatic Tool Co., treasurer.

Need for Increased Power Output in Northwest Seen

SEATTLE

Executives of public and private utilities in the Pacific Northwest, who have long been engaged in a controversy over power production, appear to have reached an agreement of the need for more power. At a meeting in Tacoma recently it was decided to make a united effort to obtain government appropriations that would increase the power output of the Bonneville Administration by 1,565,000 kw by Nov. 1, 1953. Its capacity currently is approximately 1,238,000 kw.

Need for increased power capacity was admitted in the following statement of policy by the utility executives: "It is recognized that provision for future supplies of electric power adequate to maintain continued industrial, agricultural and utility developments in the Pacific Northwest depends upon the construction of multiple-purpose projects on the Columbia river and its tributaries."

Further emphasizing the acuteness of the situation was the disclosure by Paul J. Raver, Bonneville administrator, that deliveries from Northwest power plants in the power pool have reached an all-time hourly peak of 2,574,000 kw, leaving an hourly reserve of only 150,000 kw for the area. These figures compare with a wartime high of 2,233,000 kw. He added that the present reserve would be practically wiped out if only one of the Grand Coulee generators, capable of producing 120,000 kw, were to go out of commission, and stated that Bonneville has already prevented industrial expansions which would have required a considerable amount of power.

Overhead traveling crane capable of lifting a million pounds is shown being erected at Hunter's Point, Calif., in accompanying views

Overhead Crane at Naval Yard Capable of Lifting 500 Tons

AN OVERHEAD traveling crane capable of lifting battleship gun turrets and other huge sections weighing as much as 500 tons is being erected by the American Bridge Co. in the San Francisco Naval Shipyard, located at Hunter's Point, Calif.

Completion of the giant lift will make Uncle Sam fastest on the draw among the nations in the replacing of battleship guns. These large caliber weapons wear down their rifling in a comparatively few rounds and the guns and their turrets are exchanged for new or reconditioned units.

Faster repair service for fighting ships also will be made possible by the lift, which will consist of twin cranes that will operate singly or in tandem atop a bridge type runway 207 ft high. The structure is designed to resist earthquake shocks and high wind loads.

The 760 ft runway spans a pier 405 ft wide, extending 162½ ft over the water on each side. The cranes will run out over the bay where they can operate their main hooks through a vertical range of from 25 feet below to 160 feet above the water level.

Besides a main hook having a rated capacity of 250 tons at a hoisting speed of 10 ft a minute, each crane has an auxiliary hook with a rated capacity of 50 tons lifted at 30 ft a minute. Loads in excess of 250 tons will be lifted by coupling the two cranes. They then will use an equalizer beam which will give them a combined hoisting capacity of 500 tons at 10 ft a minute.

A total of 8400 tons of steel went into the runway structure and the cranes.

Employment in Los Angeles Nears Wartime High Peak

LOS ANGELES

Industrial expansions in Southern California continued to climb during December, and for the seventh consecutive month manufacturing plants in the Los Angeles area showed increases in payrolls, according to a report by the research department of the Security-First National Bank of Los Angeles. In all industrial fields, except aircraft and shipbuilding, expansions now virtually equal the wartime peaks, the report indicated.

Production workers in the area totaled 193,000 in December, representing a gain of 27 per cent over the postwar low of 151,000. The December figure is only 3 per cent below the wartime high of 199,000.

Simultaneous with mounting payrolls, however, was an increase in unemployment claims, which increased for the second successive month. The total number of claims in a typical week in mid-December was 144,000. Four weeks earlier it had been 137,300, and at the end of October was 125,600 for the area.

Rheem Buys Fraser's Gas Furnace, Appliance Line

Purchase Feb. 1 of the entire gas furnace and appliance business including patents, trade name, inventories and some equipment of Fraser Furnace Co. Inc., Stockton, Cal., has been announced by Rheem Mfg. Co., New York. The Rheem company plans to manufacture the Fraser line at the latter company's Stockton plant under a lease agreement and will also produce Fraser products at Rheem's heating equipment plant in Chicago.

Dow Planning $20 Million Expansion of Texas Plant

Dow Chemical Co., Midland, Mich., last week revealed plans for a $20 million expansion of its Freeport, Tex., plant as part of an agreement under which Dow purchased facilities for the production of chemicals from War Assets Administration for over $35 million.

The first of three projects in the expansion is the construction of a $5 million ethylene plant, for which bids are now being received, according to Dr. A. P Bentel, general manager, Dow's Texas Division. This project is in addition to a $15 million building program now under way which is expected to be completed by the end of the year, Dr. Bentel disclosed.

Men of Industry

T. M. DILS

REBER C. STUPP

R. S. POISTER

T. M. Dils has been appointed plants manager, Delco Products Division, General Motors Corp., Dayton, O. Prior to his new appointment he was chief inspector and manager of inspection and standards for the past 10 years. **Milton E. Feldstein** succeeds him in that position. **C. L. Balbach** has been named to replace Mr. Feldstein as general superintendent of indirect manufacturing and **C. O. Hutchens** general superintendent of productive manufacturing.

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R. T. Stafford has been appointed assistant to vice president, Allis-Chalmers Mfg. Co., Milwaukee. **J. W. McMullen** has been named general manager of the Pittsburgh works of the company.

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G. Lawton Johnson has been appointed assistant general manager of sales, National Tube Co., Pittsburgh, subsidiary of U. S. Steel Corp. He will handle sale of products manufactured at the Christy Park Works, McKeesport, Pa., and some of the company's other fabricated products.

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Walter B. Archer has been appointed Detroit district sales manager for the Hodson Corp., Chicago.

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James H. Marks has joined Dearborn Motor Corp., Dearborn, Mich., as consultant to co-ordinate procurement and engineering of farm implements.

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Ernest W. Pittman has been elected chairman of the executive committee, Interchemical Corp., New York. He has been president since 1937 and is succeeded by **Herbert B. Woodman.**

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Jay Gould Coutant, fuel engineer, has become associated with the Barium Steel Corp., New York, and will supervise the fuel and refractory activities of the Barium subsidiaries in the steel and allied industries.

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Joseph E. Rogers, Cleveland industrialist and president of Addressograph-Multigraph Corp., Cleveland, until his retirement last year, has been elected a director and member of the executive committee of Jack & Heintz Precision Industries Inc., Cleveland. **Reber C. Stupp** was elected vice president and director of the company. He has been associated with General Motors Corp., and for the past 4 years was its plants manager in the three Dayton and two Cincinnati plants.

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Sam Dansker has been appointed export sales manager, Monarch Machine Tool Co., Sidney, O.

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The Carborundum Co., Niagara Falls, N. Y., has made the following changes to the Refractories Division sales organization: **Robert A. Barr,** formerly district sales manager of the Chicago territory, has been named assistant sales manager. He will have direct control of the division's field sales force, and eventually will make his headquarters at Perth Amboy, N. J. **Arthur A. Turner** has been selected as technical assistant sales manager and will be in charge of the sales development department, with offices at Perth Amboy. **Richard D. Rudd** has been named refractories engineer in the Chicago territory succeeding Mr. Barr. **D. Worth Polhemus** has been transferred from the Cincinnati to the Philadelphia district, succeeding **J. G. Fritzinger,** who has been appointed district sales manager for the Abrasive Division in the Philadelphia district. **J. H. Wisby** will take over the Cincinnati territory as refractories engineer.

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R. S. Poister has been appointed vice president, Crucible Steel Co. of America, New York, and will make his headquarters in Pittsburgh. He was formerly associated with Youngstown Sheet & Tube Co., Youngstown, O.

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M. Castellvi, Yoder Co., Cleveland, has been appointed export agent for South America.

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Eugene W. Morris has been appointed vice president in charge of engineering, Luscombe Airplane Corp., Dallas, Tex. He formerly was chief engineer for the corporation.

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Wilson Oelkers has been appointed purchasing agent of the Radio Division, Philco Corp., Philadelphia, and **William Chaffee** has been appointed purchasing agent of the Refrigerator Division of the corporation.

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James W. Birkenstock has been appointed manager of future demands department, International Business Machines Corp., New York.

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C. W. Little has been appointed sales manager of the Heating Division, Fedders-Quigan Corp., Buffalo.

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The B. F. Goodrich Co., Akron, has established a district office of the Industrial Products Sales Division, in Cincinnati. **John S. Gulledge** has been appointed district manager.

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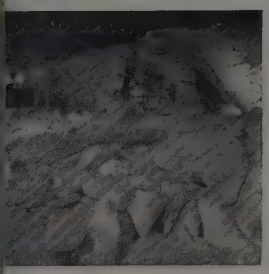
Harry M. Heckathorn, executive vice president, and **Charles A. Morrow,** vice

INDUSTRY BANS RUST AND CORROSION

with EVERLASTING FASTENINGS

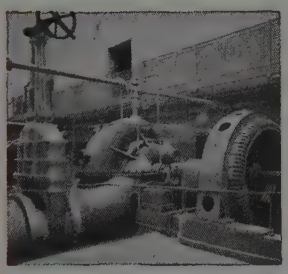
Few industries can escape the destructive effects of rust and corrosion but *all* industries can reduce their costly ravages in maintenance and breakdown.

Here are six industrial applications where Harper's EVERLASTING FASTENINGS have licked rust and corrosion.



MONEL STOPS CORROSIVE CHEMICALS

Problems in salt production have been solved by using Monel bolts. In mining, treating and handling of many chemicals, non-ferrous alloys are the answer to efficient operation.



BRASS GUARDS WATER SYSTEMS

In valves and pumps that compose the heart of water works, Brass fastenings help in eliminating the most common cause of replacement—rust.

STAINLESS STEEL SOLVES OIL PROBLEMS

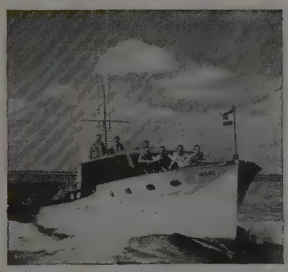
Acids and gases at high temperatures attack metal but Stainless Steel alloys cut refinery replacements to a minimum, assure years of continued operation.

STAINLESS STEEL KEEPS FOOD PURE

Food handling and processing offer many corrosive environments to common steel. Stainless Steel or Monel metal fastenings belong where cleanliness is paramount.

UTILITIES CHOOSE SILICON BRONZE

Weather is the bug-a-boo in power lines and other utility applications. Silicon Bronze Bolts reduce season "cracking" and maintenance costs.



NAVAL BRONZE WINS ON THE SEA

Marine applications demand high strength plus resistance to salt air and water. Naval Bronze fastenings have proved their dependability in marine diesels and ship fittings.

If you have rust or corrosion problems in our industry, it will pay you to use Everlasting astenings. Consult Harper engineers or order any f more than 4850 types and sizes of standard astenings carried in stock.

ranch offices: New York City • Philadelphia • os Angeles • Milwaukee • Cincinnati • Dallas

Representatives in Principal Cities

HARPER

Everlasting Fastenings

Chicago

THE H. M. HARPER COMPANY

2646 Fletcher Street • CHICAGO 18, ILLINOIS

president, have been elected directors of Mullins Mfg. Corp., Warren and Salem, O.

—o—

Warren H. Hackett and **E. A. Doerschuk** have been appointed assistant treasurers of the B. F. Goodrich Co., Akron. **H. V. Gaertner,** formerly assistant treasurer, has been named controller succeeding **T. B. Tomkinson** who recently retired.

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Colonel G. deFreest Larner has been elected a director of H. K. Porter Co. Inc., Pittsburgh.

—o—

Paul N. Berner has been appointed vice president in charge of sales and advertising for Collman Mfg. Co., Erie, Pa. He was formerly sales manager for Lovell Mfg. Co., Erie, Pa.

—o—

Dr. Gabriel Bosschieter and **Clarence D. Kirkeby** have become associated with the R. M. Hollingshead Corp., Camden, N. J., in its Coatings Division.

—o—

Oscar E. Nordstrom, Norton Co., Worcester, Mass., who has been the Chicago district manager of the Grinding Machine Division for 20 years, has retired from active duty but will continue to act as a consultant. He is succeeded by **Robert D. Lawson,** formerly sales representative for the Norton Grinding Machine Division in northern New England territory. **B. Harold Lewis** succeeds Mr. Lawson.

—o—

Clarence R. Abitz has been appointed general manager, McKees Rocks Works of the American-Fort Pitt Spring Division, H. K. Porter Co. Inc., Pittsburgh.

—o—

Dr. Emerson George has been appointed manager of the New York branch, Berger Mfg. Division, Republic Steel Corp., Cleveland. He is succeeded by **William J. Young Jr.,** as manager of locker sales for Berger Mfg. Division.

—o—

G. Rider Neff and **Frank G. Kaufman** have been named vice presidents, Cleveland Cap Screw Co., Cleveland.

—o—

Henry P. Raid has been appointed chief engineer, Universal Atlas Cement Co., New York, subsidiary of United States Steel Corp. He had been assistant to the president of Universal Atlas Cement Co.

—o—

Stewart Walls, Eaton Mfg. Co., Cleveland, has been promoted to factory manager of the company's Axle Division, and **C. C. Wickson** to plant superintendent of the same division.

—o—

Buford M. Stubblefield, Youngstown Sheet & Tube Co., Youngstown, recently named general superintendent of the Campbell works and steel plant in Youngstown, has been further promoted as Chicago district manager of the company. He succeeds **R. S. Poister** who resigned to join Crucible Steel Co. of America, New York.

—o—

John B. Girdler has been appointed assistant general manager of sales, Vanadium Corp. of America, New York.

—o—

J. Milton Moon has been appointed sales manager, Signode Steel Strapping Co., Chicago. He had been manager of field engineering and research for the company.

—o—

George E. Sibbett, co-owner with **James V. Coulter** of the Coulter-Sibbett Steel Co., Oakland, Calif., has retired. The company will, hereafter, be known as Coulter Steel & Forge Co., Emeryville, Calif. **George Burnside, Bob Traver, Erik Kallin** and **Dick Nelson** continue their association with the firm.

—o—

Herbert Harig, partner, Harig Mfg. Co., Chicago, has been elected president Tool & Die Institute, Chicago. **E. I. Danielson,** vice president, Service Tool Die & Mfg. Co., Chicago, was named vice president, and **Stuart H. Sinclair** sales manager, Federal Tool Corp. Chicago, treasurer. **George W. Rockwood** continues as secretary.

—o—

Douglas C. Yoder and **Edmund H. Kanzenbaugh** have been elected directors of the Yoder Co., Cleveland. **Frank R. Sergeant,** formerly assistant secretary-treasurer, was re-elected director and also promoted to secretary-treasurer to fill vacancy caused by the recent retirement of **Harvey O. Yoder. James Dalgleish,** formerly chief auditor, was named assistant secretary-treasurer. **John Lucas,** president, and **A. C. Husband** attorney, were re-elected as directors.

—o—

Howard W. Dunbar has retired as vice president and general manager of the Grinding Machine Division, Norton Co., Worcester, Mass. He will be retained as a consultant and will act in an advisory capacity. **Everett M. Hicks** has been appointed assistant manager Grinding Machine Division. He was formerly assistant controller of the firm. **Dr. Irving Clark** has retired from the position of director of personnel of Norton Co. but will continue to be in charge of the Norton plant hospital. **Harry E. Howard** has been appointed manager of personnel.

—o—

Henry M. Schmitt has been named industry manager, Brown Instrument Co., Philadelphia, subsidiary of Minneapolis-Honeywell Regulator Co., Minneapolis. He is succeeded in his former position

CLARENCE R. ABITZ

J. MILTON MOON

HOWARD W. DUNBAR

KOOLPORE
GRINDING WHEELS

These BAY STATE abrasive products, manufactured with large pore spaces are especially suitable for SURFACING and TOOL and CUTTER jobs that require extra coolness of cut and heavy, fast removal of metal.

Our sales and distributor representation is located in nearly every principal city. Let them, and us, solve your grinding problems.

Top Performance Consistently Duplicated

BAY STATE ABRASIVE PRODUCTS CO. • WESTBORO, MASSACHUSETTS, U.S.A.

E. M. SCHULTHEIS

as industrial manager of the Philadelphia branch of Brown Instrument Co. by **O. B. Pyle. I. K. Farley** has been placed in charge of the major petroleum accounts in the Philadelphia area and **Harry D. Ruch** will also work out of the Industrial Sales Division at Philadelphia. **A. W. Roat** has been promoted to industrial manager of the St. Louis branch of the Industrial Division of Minneapolis-Honeywell Regulator Co. to succeed **V. H. Hiermeier** who has been transferred to the Honeywell International Division, and probably will be assigned to a foreign post.

—o—

E. M. Schultheis has been appointed manager of sales, Clark Equipment Co., Buchanan, Mich. He was formerly manager of sales for the Automotive Division. **Leo A. Bixby** has been appointed manager of engineering for the company. **Edwin B. Ross** and **Ezra W. Clark,** vice presidents of Clark Equipment, have retired from active service but both will remain on the board of directors.

—o—

Oren W. Sharples has been appointed factory representative, Continental Screw Co., New Bedford, Mass. He will cover the states of Ohio and Indiana. Mr. Sharples replaces Kenneth R. Corson, who on his return from the service has been assigned an eastern territory.

—o—

Walter C. Weigle has been named to represent the Detroit Die Corp. throughout Wisconsin. He will make his headquarters in Milwaukee. Mr. Weigle has had a long and varied experience in the machine tool and allied fields and for the past eight years has been sales manager and purchasing agent for the Superior Steel Products Corp., Milwaukee.

—o—

John G. Farrar has retired from General Electric Co., Schenectady, N. Y. Formerly comptroller of General Electric, he has been, since last fall, on the staff of the president of the company.

—o—

W. W. French Jr. has been elected president of Moore-Handley Hardware Co., Birmingham, succeeding his father who has been made chairman of the board. **George J. Hearn Jr.,** who has served in the latter position since recent sale of the business, will continue in an advisory capacity as chairman of the executive committee.

—o—

L. M. Nesselbush, vice president, Falcon Bronze Co., Youngstown, has been named general manager of the company. **W. J. Brown,** newspaper executive, has been named a director of the company.

—o—

John S. King, Fairbanks, Morse & Co., Chicago, has been appointed manager of the Chicago branch, succeeding **Frank V. Roy** who retired in March.

—o—

J. W. Myers has joined the Yoder Co., Cleveland, in a sales engineering capacity. He was formerly with the Wean-Broden Construction Co., Cleveland. **Joseph U. Ridder,** recently with the Kane & Roach Co., Syracuse, N. Y., has joined the Yoder Co. as superintendent of its roll grinding department.

—o—

H. J. French has been appointed assistant vice president, International Nickel Co. of Canada, Ltd. He joined International Nickel in 1929 as a member of its Research Laboratories in Bayonne, N. J., and since 1943 has been assistant manager of the Development & Research Division of the company.

—o—

Dr. Karl T. Compton, president, Massachusetts Institute of Technology, Cambridge, Mass., will receive the Washington Award of the Western Society of Engineers.

—o—

T. Albert Potter, president, Elgin National Watch Co., Elgin, Ill., has been elected chairman of the board of directors of the Illinois Manufacturers' Association, Chicago, of which he is a past president.

—o—

R. J. Neville, superintendent of the Ford Motor Co. plant at Edgewater, N. J., has been named plant manager of the new Lincoln-Mercury assembly plant now under construction at Metuchen, N. J.

—o—

The Standard Control Division, Westinghouse Electric Corp., Pittsburgh, has moved from East Pittsburgh to the company's newly acquired plant in Beaver, Pa., and has made the following appointments to the new plant: **C. A. Pickering,**

AUSTIN E. THOMAS

manager of manufacturing; **Leland Atkinson,** works engineer; **Eric Pe** superintendent of manufacturing; **R. Scott,** sales manager; **G. C. Woodwa** order service manager; and **L. W. Dy** engineering manager.

—o—

Austin E. Thomas has been appoint sales manager, Construction Machin Division, Chain Belt Co., Milwauk He has been associated for over 20 ye with the construction machinery ind try.

—o—

A. W. Weckerly has become ass ated with the Ft. Pitt Steel Casting vision, Pittsburgh Steel Foundry Co McKeesport, Pa. He will serve as sales engineer.

—o—

George McMeans has resigned as g eral superintendent, Roebling, N. plant of John A. Roebling & Sons Trenton, N. J., to become assistant g eral superintendent of the Fonta Calif., works of Kaiser Co. Inc.

—o—

Robert W. Rosin has been named head the advertising department of C cago-Latrobe Twist Drill Works, C cago.

—o—

Christian E. Jarchow, vice presid and comptroller, International Harves Co., Chicago, has been elected a dir tor to succeed the late **Sydney G. Allister. Merle J. Trees,** chairman, C cago Bridge & Iron Co., Chicago director of International Harvester si 1943, has been elected a member of executive committee of the board.

—o—

Chester Peterson has been appoin physicist in the resistance measureme section of the National Bureau of Sta ards, Washington.

—o—

Stuart L. Parsons has been appoin chief engineer for the Tungsten & Che

PAUL V. GOODMAN
pointed director of purchases, Davey Compressor Co., Kent, O. Noted in STEEL, Jan. 27 issue, p. 64.

HAROLD A. HALLSTEIN
Elected executive vice president, Austin Co., Cleveland. Noted in STEEL, Jan. 27 issue, p. 68

HARVEY T. GRACELY
Elected president and general manager, Marion Power Shovel Co., Marion, O. Noted in STEEL, Jan. 27 issue, p. 64

ls Division of Sylvania Electric Prodts Inc. at Towanda, Pa.

—o—

. **Dan Delanty** has been appointed ident salesman in the Tri-Cities area, ering the states of Illinois, Iowa and braska for Bliss & Laughlin Inc., rvey, Ill.

—o—

ames S. Wroth and **Robert W. Barker** e been elected directors of Internaal Mining Corp., New York. Mr. oth is a vice president of the comy and a mining engineer. Mr. Barker head of the research department of ams Express Co., New York.

—o—

he Cleveland Tool & Supply Co., veland, has made the following apntments in the organization: **Charles Wright**, chairman of the board and surer; **H. E. Ruhf**, president; **O. C. tich**, vice president and secretary; . **Coventry**, assistant treasurer; **W. E. les**, general sales manager; **R. L. Fox**, onnel and office manager.

—o—

Dr. H. Ries, Ithaca, N. Y., is chairman **Peter E. Kyle**, professor of applied allurgy, Cornell University, Ithaca, is vice chairman of the new Sand Division Executive Committee of American Foundrymen's Association, Chicago.

—o—

W. H. Laughton, general manager, West Coast shipyards, Bethlehem Steel Co., Bethlehem, Pa., has been elected president of the Propeller Club of the United States, port of San Francisco.

—o—

Robert D. Bernhard has been appointed to supervise sales in the Indianapolis territory of the Hewitt Rubber Division of Hewitt-Robins Inc., Buffalo.

—o—

Arthur B. Pike has been appointed representative in the Boston area, Farrel-Birmingham Co. Inc., Ansonia, Conn.

—o—

Laurens H. Fritz has been appointed industrial advertising manager, Sun Oil Co., Philadelphia.

—o—

The Detroit Broach Co., Detroit, has appointed three sales representatives in the Midwest. **Donald F. Wilkes** and **Roy C. Matzen** will cover northern Illinois, eastern Iowa and Wisconsin with offices in Chicago and Milwaukee. **Jack D. Dustman** has been appointed representative for northeastern Ohio.

—o—

William A. Mara has been appointed director of advertising, Bendix Aviation Corp., Detroit. He succeeds **Herbert L. Sharlock** who has been granted a leave of absence.

—o—

L. A. Garber has been elected a director and vice president, Harbison-Walker Refractories Co., Pittsburgh. He also has been named general manager. Mr. Garber is vice president of Northwest Magnesite Co., a subsidiary of Harbison-Walker Refractories Co.

—o—

James P. Cunningham, Luscombe Airplane Corp., Dallas, Texas, has been promoted to vice president of the corporation.

—o—

L. A. Spangler, Westinghouse Electric Corp., Pittsburgh, has been named district transportation manager of the corporation's northwestern district.

—o—

A. Gordon Wilson, formerly with Ekco Products Co., Chicago, has been appointed purchasing agent for Reynolds Wire Co., Dixon, Ill.

BITUARIES . . .

larence C. Hermann, president and eral manager, C. C. Hermann & Astes, Detroit, died Jan. 20.

—o—

lliott P. Ross, 57, died recently at his e, Forest Hills, Long Island. He retired this year as chief engineer of Ford Instrument Co., Long Island , N. Y.

—o—

obert G. Scott, 52, vice president and general sales manager, Revere Copper & Brass Co., New York, died recently.

—o—

Edward G. Mockly, 58, founder and president, Middle States Foundry & Mfg. Co., Milwaukee, died at his home recently, after a heart attack.

—o—

Marcus Coolidge, 81, died in Miami, Fla., recently. One time manager of the Fitchburg Machine Works, Fitchburg, Mass., and president of the Seneca Falls (N. Y.) Machine Co., Mr. Coolidge also served as U. S. Senator from Massachusetts in 1931-37. After the first World War, President Wilson appointed him special envoy to Poland, representing the Peace Commission.

—o—

William B. Olle, 77, founder and operator of Racine Aluminum & Brass Foundry, Racine, Wis., died in Milwaukee recently.

—o—

Robert D. Heflin, 63, eastern sales manager for Gisholt Machinery Co., Madison, Wis., died Jan. 23, in Maplewood, N. J.

Synchronize STAMPIN

By DANIEL DEWEY

Vice President and Manager
Stamping Division
Eaton Mfg. Co.
Cleveland

Close co-ordination of manufacturing facilities necessary to avoid bottlenecks in quantity production of bumper guards, hub caps and other automobile parts. One modern plant geared to a daily output of 10,000 to 15,000 items

YNCHRONIZED for daily volume production of ten fteen thousand vertical bars, hub caps, gas, radiator oil caps and necks, the stamping and plating facilities Eaton Mfg. Co.'s stamping division, Cleveland, are esentative of the latest equipment used in large-scale ufacture of these much-needed automobile compon- The current plating schedule requires about 90,000 of generator capacity, 35,000 gal of nickel solution 3000 gal of chrome solution per day. A complete atory is maintained for regular analysis of the clean- and plating solutions, as well as for determining thickness and salt spray testing.

e vertical bars, which are also called bumper guards nade of 12 or 13 gage, cold-rolled SAE 1010 strip, lly with No. 2 finish and No. 4 or No. 5 temper. Most ese can be stamped in three operations: First is a loped blank; second, a form and pierce and the third, n operation. These require presses of sufficient ton- shut height and stroke to accommodate the dies for particular size and shape. The pieces have to be care- polished after the press operations, particularly if are to be bright nickel plated with no buffing operation afterward. Usually, the ends are polished by hand with a canvas wheel and 140 emery. The sides and tops are finished by running the parts over an automatic polishing machine with 150 and 200 emery.

The company is now nickel plating steel with McGean's bright nickel solution, using a Hanson-VanWinkle 900 to 1000 pieces per hour capacity full automatic tank. The work is first prewashed in a washing machine and then racked, usually six pieces to a rack. The rack then travels through electric cleaners, rinses, acid dip and rinse before reaching the plating tank. After coming out of the plating solution, there is a save, cold and hot water rinse.

The complete cycle takes 72 min and the parts are in the plating solution for 45 min. The regular McGean specifications are maintained as far as the bright nickel solution is concerned. Current density is about 40 amp per sq ft. The result is a bright nickel finish which does not re-

ND PLATING

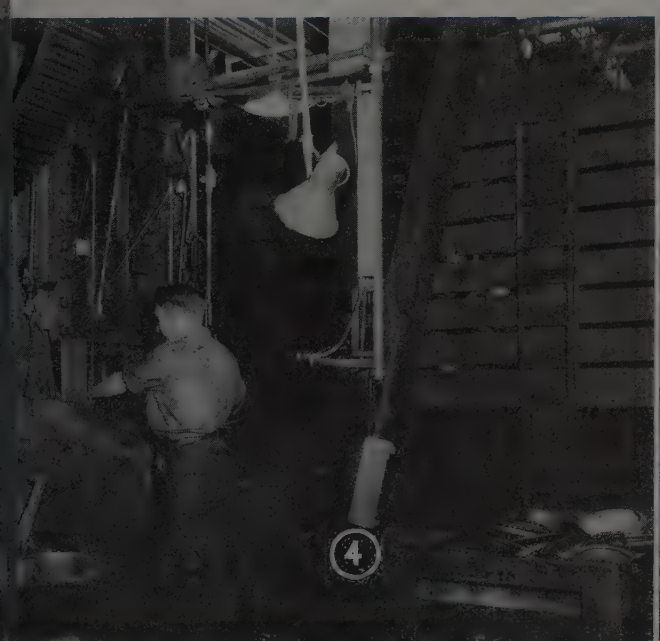
Fig. 1—Hand polishing machines for reaching areas of vertical bars which are inaccessible to straight line automatic polishers

Fig. 2—Two 350-ton Hydraulic presses are used in forming regular shave of hub caps

Fig. 3—Trimming bumper cutout on Consolidated double crank punch press. Two vertical bars, or bumper guards, are trimmed simultaneously. Trimming is necessary for bar to fit contour of bumper

Fig. 4—Steel inserts for hub caps are purchased as circular blanks from an outside source, cupped on double action toggle press. A bead is rolled on rim of cup before it travels to press for blow-out to final shape on water die, above. Conveyor at right carries hub caps along to storage bins

Fig. 5—Gasoline tank caps that are to receive paint finish are placed on endless chain conveyor fitted with special adapters which correspond to size of cap to be sprayed



quire buffing and has good adhesion and ductility. The thickness of plate required is 0.0015-in.

Parts are then ready for chromium plating which is done in a regular chrome bath; again with a Hanson-VanWinkle full automatic tank. This cycle includes the regular electric cleaner, rinse, acid dip, rinse, 2½-min in the chrome tank, a save, cold and hot water rinse. Six pieces are used per rack and the total cycle is 15 min. Incidentally, the chromium plating tanks have a capacity of about 750 pieces per hour. The vertical bars are then sprayed with aluminum paint in the inside and packed in suitable cartons for shipment.

The standard type of automobile hub cap is a two-piece assembly. The insert is made of cold-rolled steel with a zinc-plated finish; the outer shell is brass, chrome plated. The insert is stamped from 20 gage strip or circles. First operation is draw and pinch trim, after which a bead is rolled on the edge. It is then expanded in a pressure die to its final shape. A regular zinc-plated finish to withstand 100 hours salt spray test is supplied in a semiautomatic circular type plating tank after the cleaning and rinsing operations. Usually six pieces are placed on each rack.

The shell of the hub cap is entirely brass, approximately 0.015-in. thick. This is stamped from circles and embossed with the appropriate car manufacturer's design. The shells are then cut and color buffed before bright nickel plating. At present, a Udylite solution is being used for this plate and the equipment is the same as used for the steel vertical bars. The plate thickness, however, is only 0.003-in., and therefore the time of the nickel solution is cut down to 25 min. Twenty amperes per square foot of current are used and the shells are racked six pieces per rack. The shells are then chromium plated in a Udylite full automatic chrome tank, with almost the same sequence of operations and time that is required for plating the steel parts.

After being chrome plated, the shells are inspected and assembled to the inserts and crimped or locked in a press. Hub caps are then spray-painted by use of a mask. The paint requires baking at 300° F in an infra-red conveyor type baking oven, allowing 10 min baking time. The finished hub caps are packed in cartons for shipment with suitable pads or dividers to prevent marring the finish in transit.

Fig. 6—Automatic straight line polishing machine has nine wheels set in line at different angles which thoroughly polish remaining surfaces of vertical bars as they move from one section to the next

Fig. 7—Vertical bars passing through full automatic nickel plating tanks

Fig. 8—As brass shell for hub cap enters the full automatic nickel plating tanks it is dipped first in cleaner to remove superficial stains, grease and buffing compound. Then comes a water rinse followed by an acid rinse to remove any remaining stains. After this it undergoes another water rinse and then passes into nickel bath where coating is applied electrolytically. This is followed by chrome plating mirror finish

Fig. 9—Spray-painted hub caps are baked for 10 min at 300° F in this infra-red conveyor-type baking oven

Air Pressure SPEEDS AUTOMATIC WELDING

New operating principle involves high air pressure up to 1000 psi to control sequences in fast, automatic multispot resistance welding. A second development is a storage battery-powered machine that provides excessive power needed for flash welding aluminum

APPLICATION of new operating principles involving h air pressure to control welding sequences in autotic high speed multispot resistance welding, and use of red energy to flash weld aluminum were revealed retly in the unveiling of Progressive Welder Co.'s two est machines.

Under development for 8 years at the company's Deit plant, the multispot welding machine combines high eed of operation with ability to weld different thicksses of metal requiring variable welding times, heats l speeds. Said to be faster in operation than "ultraeed" units, the Progress-O-Matic machine is of simple sign, capable of housing a maximum of 60 guns with- complicated controls and frequent adjustments.

An air-driven unit that directs the sequencing of the ire machine controls the actuation of the individual ns. This includes application of welding pressure to timg of welds, and controlling amount of welding current at for each gun. Combination of various features pers a wide variation of welds requiring both long or short lds without penalizing the complete machine cycle to ommodate the longest welds.

As a rotating, or indexing disk uncovers the first port, h pressure air is admitted to the corresponding gun cuit, operating the circuit-closing cylinder on gun No. 1. the same time the heat-control cams on the drum ect the proper heat-control for that gun and the speed ntrol cams adjust the speed of the air motor in accordce with the desired weld cycle for gun No. 1. The two eakers now close initiating the welding current to gun . 1. At the proper instant, one of the breakers opens, errupting the welding current.

The disk now indexes, closing port No. 1. Circuit-closg cylinder retracts, opening (*Please turn to Page* 144)

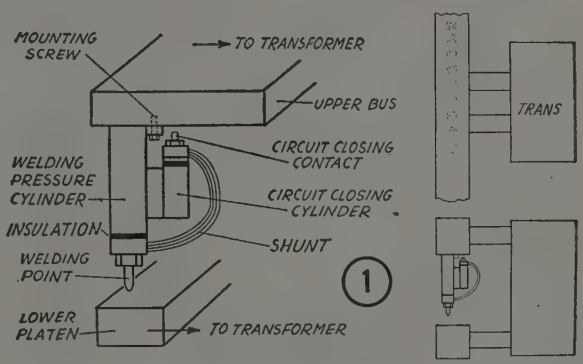
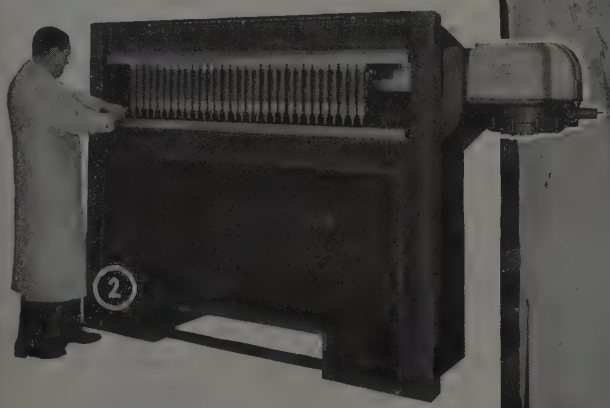
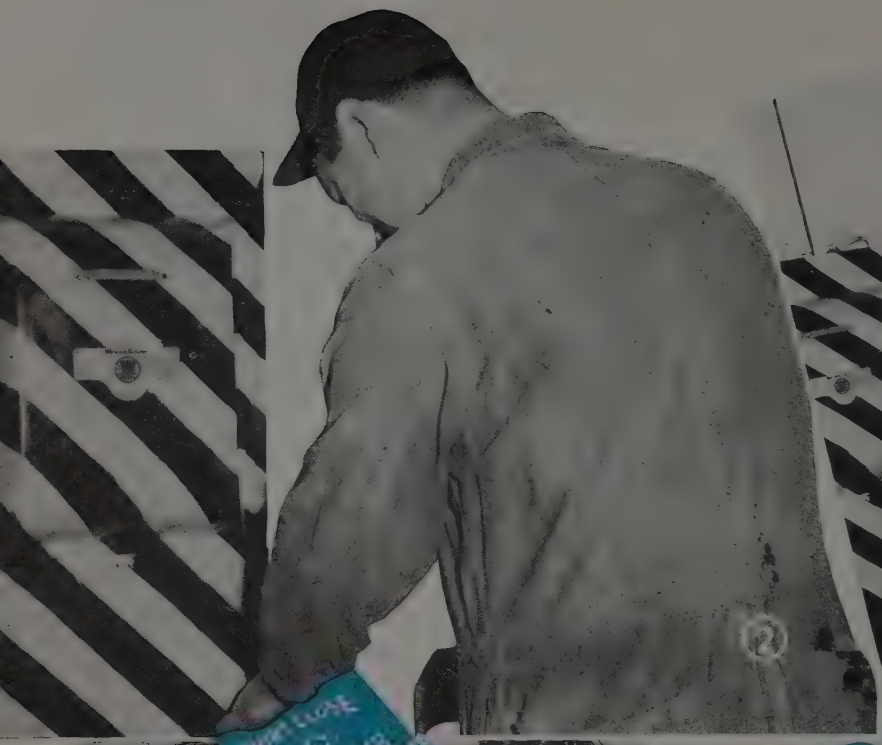


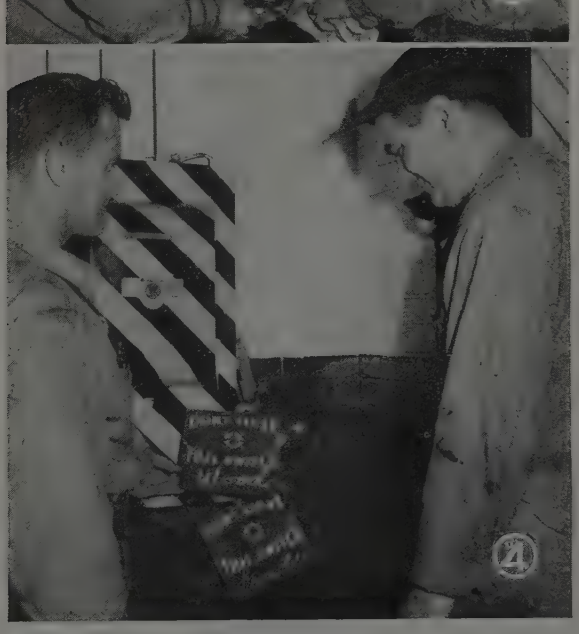
Fig. 1 (left)—Detail of single-screw gun mounting Cylinder at right of gun closes contact for that gun with upper bar just before welding current comes on for gun. (Right) Sketch showing simple electrical circuit of new Progress-O-Matic. Note short low-reactance welding loop

Fig. 2—High speed automatic multispot welding machine is operated by air pressure up to 1000 psi. Housing has 60 ports—one each for a possible maximum of 60 guns. Rotating disk uncovers various ports in sequence

Fig. 3—Flash welding miter joints of extruded aluminum window sash. Battery-powered unit does the job with about the same power requirements as for a 10 to 15 hp 3-phase motor







"LIFE-SAVING" Switch tags

SIMPLE, but effective routine followed by employees in inspecting and repairing machinery at American Rolling Mill Co., Middletown, O., is shown in the accompanying illustrations. It's one that saves lives, not to mention valuable equipment.

Before doing any "trouble shooting," as indicated in Fig. 1, the worker first must open the safety switch on the motor controlling the machine. This cuts off all power. After pulling the swith, he must tie the sign to the switch—not the box—then write his name with chalk on the sign, as shown in Fig. 2. No other person is allowed to close the switch while the worker's name is on the tag. He is fully responsible.

When more than one crew of men work on the same machine, each crew leader, Fig. 3, places his name on a separate tag, ties it to the same switch handle controlling the equipment. The switch then cannot be thrown until all names are off.

If the work is not completed, when it's time to change turns, the person whose name is on the tag must report to his foreman or foreman of the next turn to be relieved of the responsibility. His name then is removed, Fig. 4, and the name of the new man is written in.

The "tag rule," as this procedure is called, was placed in force 28 years ago, following the loss of two lives. It still is effective today.

Output Increased, Maintenance Reduced in New High Temperature Furnace

By JOHN D. KNOX
Steel Plant Editor, STEEL

Silicon carbide heating tubes and hearth rollers operate at 2500°F. High fuel efficiency obtained. Tubes long in experimental service show no signs of deterioration. Heavy roller loads conveyed through furnace either in batches, by indexing or continuously

GAS FIRED, silicon carbide, radiant burner tubes, omplete with new type atmosphere ring burners, as ell as facilities for conditioning and scrubbing the aste gaseous products of combustion from these tubes ave been developed for use as protective gas atmos-heres by Gas Machinery Co., Cleveland.

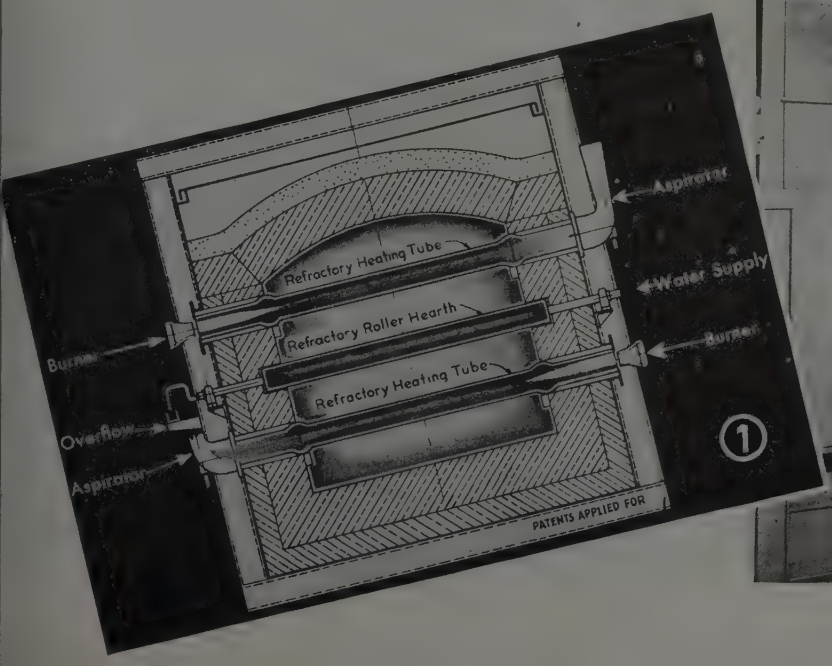
Limitations on the use of refractory tubes for radiant urners have been overcome by a novel tube joint, tube upport and tube loading construction. The ends of the licon carbide tube sections are provided with mating all and socket joints which are lapped to a substantial as-tight fit. This type of construction enables any two ube sections to have universal angular movement over range of several degrees with respect to each other, hile the mating ball and socket surfaces are in contact.

To maintain the mating surfaces in contact and to ke care of any change in length of the jointed tube, due ther to thermal expansion of the tube or to shortening the tube resulting from relative angular movements of the sections, one end section is anchored against movement, and the other end section floats against gravity, a spring or sliding counterweight which effects a compression loading. The several sections of a tube are suitably supported, usually from the furnace walls. Each support is deep enough to prevent the sections from buckling from its original plane under compression loading. The supports are usually located at the joints between the sections. Otherwise, since the supports may move with the furnace wall as it shifts in coming up to heat, for example, there might be radius effect which would increase the misalignment but which is taken up by the ball and socket joints. There is no danger of the ball and socket joint opening up due to the sagging of the sections between points of support, for silicon carbide possesses the property of increasing in strength and rigidity at elevated temperature up to approximately 2500° F.

While the ground ball and (*Please turn to Page* 122)

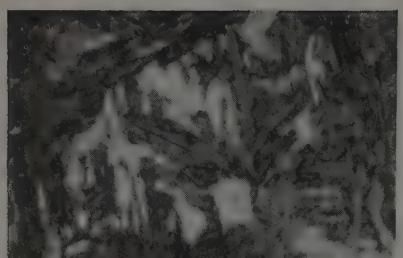
Fig. 1—Section of heating furnace showing position of silicon carbide tubes and hearth rollers

Fig. 2—Charging end of radiant heated furnace showing a portion of refractory roller hearth



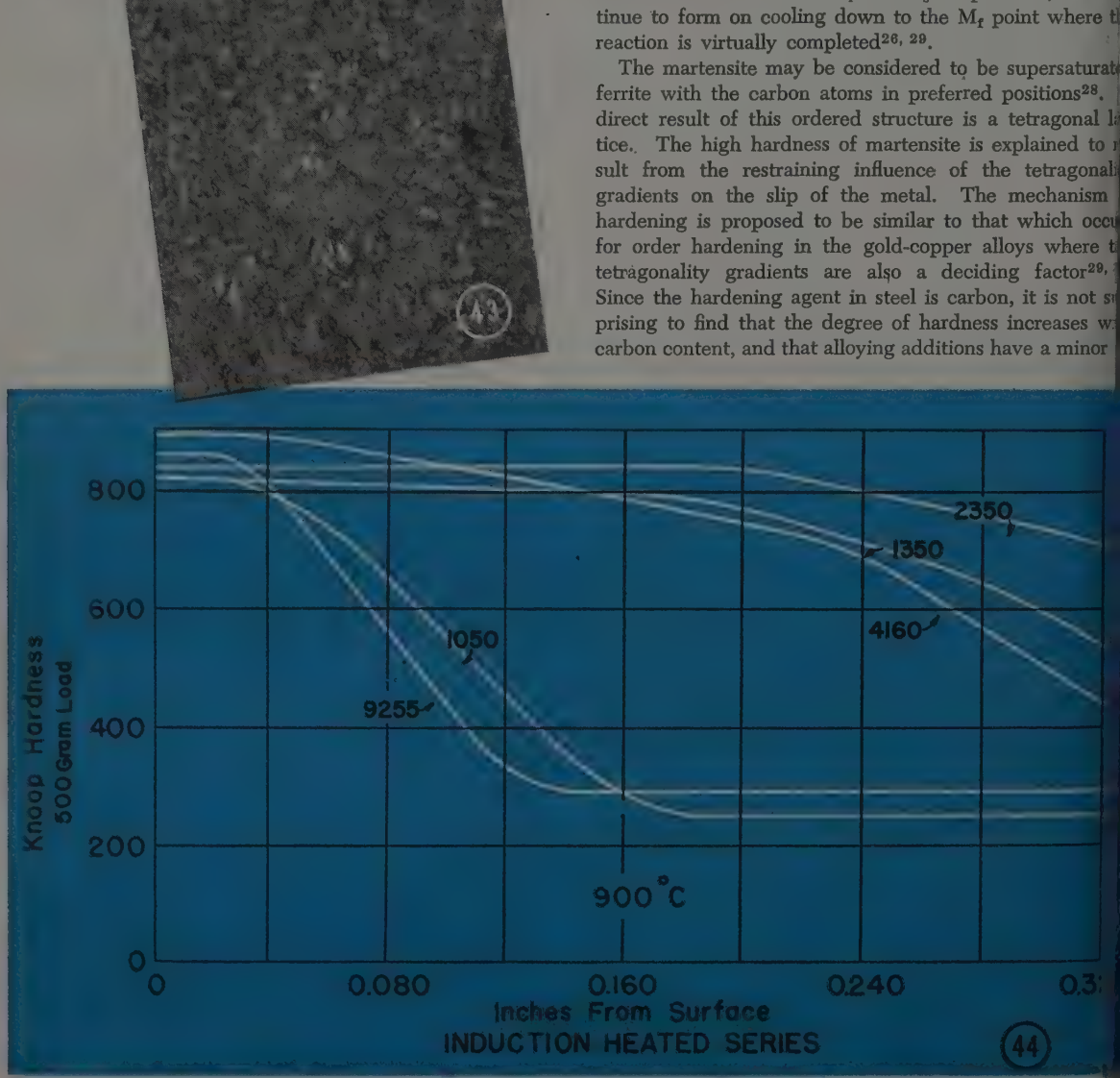
Inductio

In the metallurgical discussion of this fourth article of a series, the authors review martensite formation and the influence of alloys on hardenability, martensite tempering, internal stresses and quenching cracks



TO COMPLETE the induction hardening cyc the heated sample is quenched to transform t austenite to martensite. This requires cooli rapidly to prevent the formation of pearlite or bainite. the austenite is cooled rapidly enough to prevent the high-temperature reaction products, it will start to tra form to martensite at the A_r'' or M_s temperature, and co tinue to form on cooling down to the M_f point where t reaction is virtually completed[26, 29].

The martensite may be considered to be supersaturat ferrite with the carbon atoms in preferred positions[28]. direct result of this ordered structure is a tetragonal l tice. The high hardness of martensite is explained to r sult from the restraining influence of the tetragonal gradients on the slip of the metal. The mechanism hardening is proposed to be similar to that which occu for order hardening in the gold-copper alloys where t tetragonality gradients are also a deciding factor[29, Since the hardening agent in steel is carbon, it is not su prising to find that the degree of hardness increases w carbon content, and that alloying additions have a minor



Hardening OF STEEL

ence on the hardness[31, 32]. A minimum carbon content about 0.40 per cent is required to obtain a hardness of rockwell C.

Effect of Alloys on Hardenability: One of the main nctions of alloying elements in hardening is to increase rdenability; that is, to increase depth of hardening by creasing the critical cooling velocity for the austenite-arlite reaction. As a result, a slower quench will still sult in the formation of martensite, and for this reason, able larger masses of steel to be hardened.

Hardenability is of secondary importance in surface in-ction hardening of steel[18]. Generally, the manganese, icon, and residual elements found in commercial steels part sufficient hardenability for most surface-hardening plications where the depth of the martensitic zone is s than ⅛-in. However, occasions may arise where the ntour of the surface is such that rapid quenching is not tained, in which event, deeper hardening, alloy steels ay be required.

Hardenability will be of major importance for deep rdening by induction methods. Since manganese and nickel additions improve the austenitizing response as well as increase the hardenability, they are likely to be favored over other elements (Cr, Mo, Si, V, etc.) for alloying additions in induction hardening steels where a combination of deep hardening and high austenitizing response are required. For example, notice in Fig. 44 that the inherent deeper hardening 4160 steel hardened to a shallower depth than the SAE 1350 and 2350 steels when it was induction-heated to a surface temperature of 900°C. The SAE 4160 steel is limited in this instance by its sluggish austenitizing response, and not its hardenability. In contrast, the depth of hardening of the 1050 steel in Fig. 44 is limited by its low hardenability, and not its austenitizing response.

Effect of Alloys on M_s and M_f Temperatures: In addition to their effect on hardenability, alloys have an important influence upon the temperature at which the martensite starts to form (M_s-point), and the temperature at which the reaction is virtualy completed (M_f-point). Most of the common elements added to steel, including carbon, lower the M_s and M_f temperatures[33, 34], the result of this lowering being an increase in the quantity of retained austenite present in the steel when quenched to room temperature. Thus, it is possible to have as much as 50 per cent retained austenite in a quenched 1 per cent C, 4.8 per cent Ni steel[35]. The austenite is a soft constituent, and when present in a quenched steel it will lower the hardness.

Effect of Prior Austenite Structure: In a previous section it was shown that in general the rapid heating by induction does not allow time for homogenization of the austenite (see Fig. 39, STEEL, Jan. 27, 1947). The presence of undissolved carbide, carbon gradients, and free ferrite in the austenitic matrix may influence the transformation of austenite on cooling by promoting the formation of pearlite, and raising the M_s and M_f temperatures.

Since the carbide-phase nucleate the pearlite reaction[36, 37], the presence of undissolved carbides, and possibly carbon concentration gradients, in the austenite will favor the formation of pearlite on cooling—that is, reduce the hardenability of the steel by decreasing the critical cooling rate. In many surface induction hardening jobs this reduction in hardenability is not of great concern, since only a thin layer on the surface is hardened. However, there are undoubtedly times when the loss in hardenability, due to incomplete austenitization, will have undesirable effects, and more attention will have to be given to the austenitizing characteristics of the steel.

The inhomogeneities in the austenite have a marked effect on the quantity of retained austenite present in the quenched steel. This is illus- (*Please turn to Page* 148)

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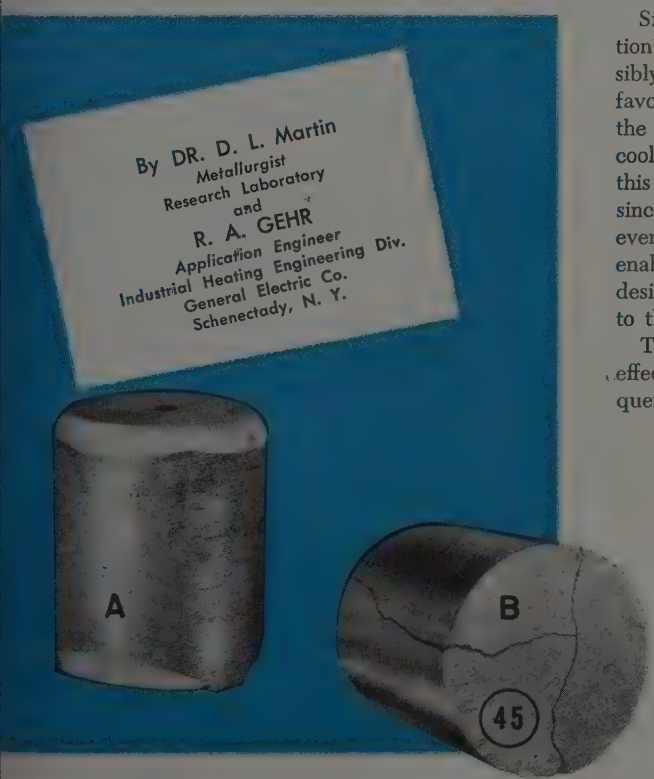


Fig. 43—Comparison of microstructures of quenched samples of SAE 2350 Steel; X1000. Top—Held 2 sec at 850° C; 61 Rc hardness. Bottom—Held 3 hours at 850° C; 59 Rc hardness

Fig. 44—Comparison of hardness penetration curves for five steels induction heated to 900° C

Fig. 45—Fractures which occurred during induction hardening; X1.5. Fig. 45A—Spalling in an eutectoid steel heated to 925° C. Fig. 45B—Cracking in a sample of 1.1 per cent C steel heated to about 1300° C

SOLUTION, AGING AND STABILIZING HEAT TREATING TECHNIQUES, TOGETHER WITH THE VARIOUS FACTORS AFFECTING MACHINING ARE DISCUSSED BY THE AUTHOR

HEAT TREATING AND MACHINING Magnesium

By ALLEN G. GRAY
Consulting Editor, STEEL

MAGNESIUM casting alloys, usually given the designation Dowmetal H, C, and G, (see Table X, STEEL, Nov. 4, 1946, p. 94) are the most commonly heat treated alloys. Three types of heat treatment designated as follows, may be given to these alloys: (1) Solution heat treatment, HT; (2) aging heat treatment, HTA; (3) stabilizing heat treatment, (a) as cast and stabilized, ACS; (b) heat treated and stabilized, HTS.

Solution heat treatment involves treatment at temperatures in the range of 500 to 800° F, depending on the exact alloy composition. It is carried out for the purpose of getting as much as possible of the alloying ingredients into solid solution. Such a treatment results in a high tensile strength, along with maximum elongation or ductility.

Aging at temperatures from 300 to 500° F, after the solution treatment, is given wherever maximum hardness and yield strength are desired.

Stabilizing treatment is given at temperatures from 425 to 550° F. While perhaps falling under the classification of aging, this treatment has some special significance since it may be applied to "as cast" (AC) metal, or after the solution heat treatment in order to obtain rapidly a complete precipitation. The effect of aging at this temperature is to give almost complete stress relief and freedom from growth due to aging in service. When applied lowing the regular solution heat treatment, a fair duct is retained due to the coarse nature of the precipi formed at the elevated temperatures. Indications are creep strength is highest in the HTS state.

While the matter of growth and stability of magnes castings is not a serious problem or one that is peculia magnesium, yet for certain accurate engine or instrun parts it may prove to be an important factor. It is in esting to note that as cast parts are subject, unless pr ously stabilized, to about 60 per cent as much growt the fully solution heat treated castings. The stabili treatment is unique in that the growth tendency is fo practical purposes eliminated. This is also the cas standard aging treatments, but in the former case, a hi ductility is retained.

Stabilizing heat treatments should not be confused "partial aging" treatments that have been used to s extent on magnesium alloys since in the short time at elevated temperature used for stabilization as muc more precipitation takes place than in the standard time aging process. Ultimate unit growth data for r nesium alloy castings in various states are given in T XII. The growth values for sand, permanent mold die castings are essentially the same. Typical prope

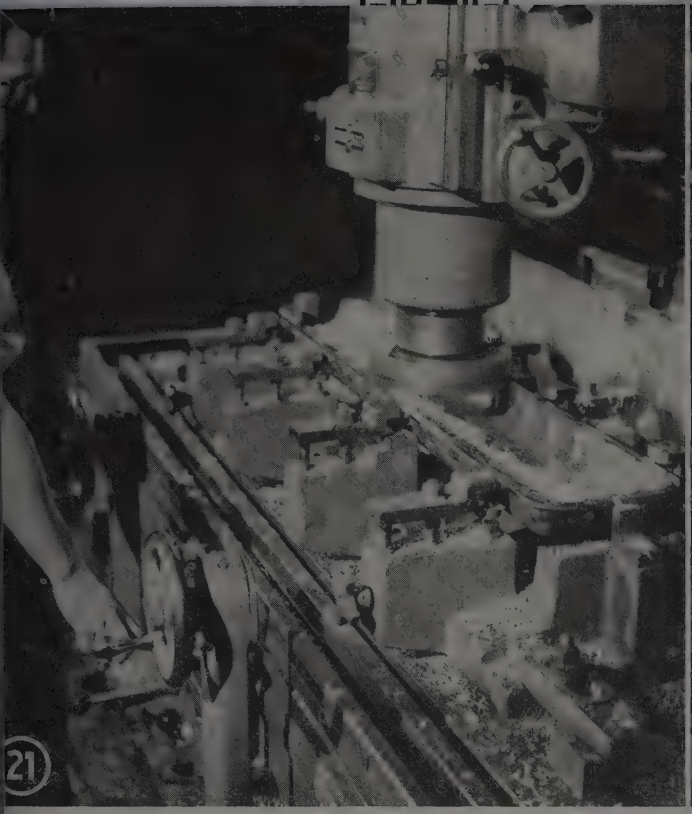


Fig. 20—Typical magnesium castings being placed in heat treating oven
Fig. 21—Surface finishing casting
Fig. 22—Machining magnesium casting. Photos courtesy Dow Chemical Co.

Alloys

etermined on separately cast test bars in various con-
ns are shown in Table XIII.

lution Heat Treatment: Heat treatment of mag-
ım castings is usually carried out before the final
ing operation. Temperatures and total times for the
common magnesium sand casting alloys are as fol-
:

Alloy H (A.S.T.M. No. AZ63): Temperature of the
sting is raised from about 500° to 730° F, ±5° F, in
proximately 2 hours. Casting is then soaked for 10
urs at 730° F, following which it is removed from the
rnace and cooled quickly in air.

Alloy C (A.S.T.M. No. AZ92): Temperature of the
sting is raised from about 500° F to 770° F, ±5° F,
2 hours. Casting is then soaked at 770° F for 18
urs, and then removed from the furnace and cooled
ickly in air.

me foundries add several hundredths per cent calcium
e casting alloys; if such practice is followed the heat
ment temperatures should be raised generally about
F.

ging Heat Treatment: The alloys are first solution
treated according to the schedule given above. All
s may then be given the same aging treatment con-
g of 8 to 16 hours at 350° to 425° F. At higher tem-
peratures, less time is required and elongation runs higher but at a sacrifice in yield strength.

Stabilizing Heat Treatment: This treatment usually consists of heating the castings, as cast, or after solution heat treatment for from 2 to 6 hours at 450° to 550° F. These treatments may be designated ACS or HTS respectively.

Heat Treating Furnaces: Circulating atmosphere, electric, or gas-fuel furnaces are used for the heat treatment of magnesium castings. Direct gas-firing is not recommended for temperatures above 740° F. Indirect gas-firing should be as satisfactory as electric heat from the standpoint of atmosphere control but might be less simple mechanically. For temperatures up to 800° F, sulphur dioxide is a satisfactory inhibitor of surface oxidation at a concentration of approximately 0.5 per cent. Preliminary tests indicate that the use of an atmosphere made by the controlled combustion of natural gas followed by dehydration appears to be a possibility.

Uniformity of temperature throughout the furnace is an important factor for high quality heat treated castings. This has been largely obtained in the modern units through the use of a very high rate of air recirculation and the placing of many thermocouples throughout the furnace to give a check of temperature uniformity at all times. It is important that the controlling thermocouple and mechanism be so placed and sufficiently accurate to make certain that no local areas in the furnace exceed the de-

sired temperature by more than 5° F.

Warpage of the casting is a factor that may require some attention. This can be largely eliminated by properly supporting the casting in the furnace. In some instances special jigs may be required to maintain the proper casting shape; however, in most cases investigation will indicate a manner of placement which will eliminate this requirement.

Rapid cooling after solution heat treatment is quite important. Drastic quenching, such as immediate plunging into a cold bath, should be avoided since it will cause a very marked reduction in properties. It is generally thought that the most satisfactory method of cooling is to remove the castings from the furnace as soon as the treatment is completed and then direct a stream of moving air onto them.

Machining: Magnesium alloys are generally considered to have excellent machining characteristics. Machining can be carried out at high speeds, usually at the maximum obtainable on modern machine tools. Heavier depths of cut and higher rates of feed than are used on other metals are possible with magnesium. Cutting tool life is good. Satisfactory surface finish is obtained because there is little tendency for the metal to tear or drag.

The free cutting action of magnesium produces well broken chips which do not obstruct the cutting tool or the machine. Accurate parts with dimensional tolerances of only a few ten-thousandths of an inch can be made by standard machining operations. The power requirements for removing a given quantity of metal are much lower for magnesium than for other commonly used metals.

Machinability: Certain physical characteristics of magnesium should be taken into consideration in order to secure the optimum results in machining operations from a production standpoint. High clamping pressures tend to cause greater springing in magnesium than in most other metals under similar conditions. For this reason care should be taken when clamping and chucking. Extremely heavy depths of cut and feeds are also apt to cause the work to spring. Reamers and taps must be designed to eliminate the springing of the metal when it is cut.

Temperatures developed when cutting magnesium are quite low, but the low heat capacity and high thermal conductivity sometimes result in magnesium parts becoming heated during machining if a considerable amount of work is performed. Under such conditions, consideration must be given to the possible thermal expansion. The coefficient of thermal expansion, which is 0.0000143 for the temperature range of 70 to 200° F, is approximately equal to that of aluminum and considerably higher than that of steel. An appreciable increase in the temperature of magnesium parts therefore will cause a slight increase in dimensions.

Power required to remove a given amount of magnesium by machining is lower than that required to remove an equal amount of any other commonly used metal. The horsepower per cub inch per minute normally required f machining magnesium varies from 0. to 0.3. Thus the lower power requir ments make it possible to take hea cuts at moderately high speeds.

All magnesium alloys are free m chining. The type of chip produced dependent upon the alloy used, the for and condition of the alloy, and the fee Rake angles, cutting speeds, and cu ting fluids, which exert major influenc on the chip formation when machini other metals, have little or no influen on the form of magnesium chips. U like most other metals, increasing t feeds used in machining magnesiu tends to produce shorter and more co pletely broken chips.

One of the outstanding machini characteristics of magnesium alloys their ability to take an extremely fine fi ish. It is usually unnecessary to gri the metal in order to obtain a smoo finished surface. Surface smoothne readings of 3 to 5 mu in. have been r ported for finish turned magnesiu These surfaces are produced at bo high and low cutting speeds with without a cutting fluid.

Tool Shapes: The low temperatu and pressures developed in cutting ma nesium allow a wide latitude in cho of tool angles, but special attenti should be paid to relief and clearan angles. Relief angles of from 7 to degrees keep the tool flanks from r bing on the work, and minimize the herence of chips to the tool. Clearan angles should be larger than those u for other metals to provide larger c spaces. Best tool life and chip for tion are obtained if the rake angles held from 0 to 15 degrees. They r be increased if it is desired to red tool forces, but some tool life will sacrificed. Smaller rake angles sho be used with carbide tools than w high speed steel to prevent chipping

Values for the end and side cut edge angles are not critical and are determined by the conditions of the dividual job. However, it is gener best to avoid large side cutting e angles, to prevent chatter. Since m nesium alloys produce a large volum chips, it is necessary that chip space considerably larger than those use tools for other metals. This is espe ly important in drills, taps, reamers milling cutters. The nose radii of should be relatively small to imp surface finish and to prevent chatte

Tool Materials: Carbon tool steels be used for finishing tools, rea drills and taps for magnesium a High-speed steel is preferred, how and is used for practically all drills, and reamers. It is also used for

TABLE XII

MAXIMUM PERMANENT UNIT GROWTH OF CAST MAGNESIUM ALLOYS AT ELEVATED TEMPERATURES

	AZ63 Dowmetal H	AZ92 Dowmetal C
AC	0.00026	0.00034
ACS	0.00012	0.00017
HT	0.00054	0.00076
HTS	0.00027	0.00021
HTA	0.00022	0.00029

TABLE XIII

TYPICAL PROPERTIES OF MAGNESIUM ALLOYS IN VARIOUS CONDITIONS OF HEAT TREATMENT

Dowmetal Alloy	Condition	Tensile Strength psi	Yield Strength psi	Elong. in 2" %	Fatigue Strength 500x10⁶ psi	Brinell Hardness 500 Kg. Load 10 mm. ball
H	AC	29,000	14,000	5	11,000	50
	ACS	29,000	15,000	5	12,000	
	HT	40,000	14,000	12	12,000	56
	HTS	39,000	16,000	8	15,000	59
	HTA	40,000	19,000	5	11,000	73
C	AC	24,000	16,000	2	13,000	65
	ACS	24,000	17,000	2	13,000	
	HT	40,000	16,000	10	14,000	68
	HTS	39,000	21,000	3	13,000	75

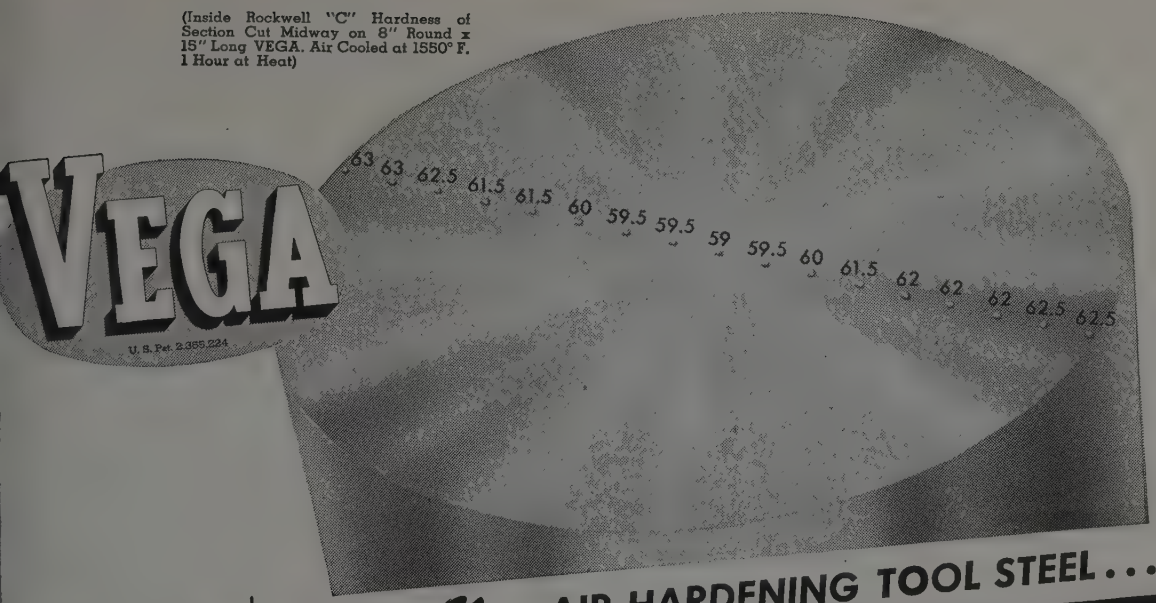
TABLE XIV

PROPERTIES OF CUTTING FLUIDS RECOMMENDED FOR MACHINING MAGNESIUM

Property	Value
Specific Gravity	0.79 to 0.86
Viscosity (Saybolt) at 100° F	Up to 55 sec.
Flash Point—Min. Value (Closed Cup)	160° F.
Saponification No. (Max.)	16
Free Acid (Max.)	0.2%

NOTE: Water soluble oils and oil-water emulsions should not be used on magnesium because of fire hazard.

(Inside Rockwell "C" Hardness of Section Cut Midway on 8" Round x 15" Long VEGA. Air Cooled at 1550° F. 1 Hour at Heat)



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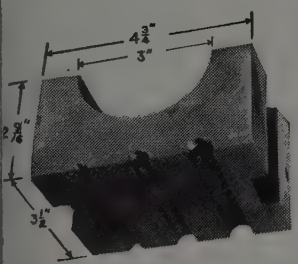

hese chucking and forming dies, first ade from an oil-hardening tool steel, pened-up" .030"/.035" across the ' diameter. To get minimum distor- n in heat treatment, the tool maker anged to VEGA.

a result, over-all expansion was ld to .0004"/.0005"—with no evi- nce of warpage. And in the tool aker's own words, "VEGA machined every respect as well as the oil- rdening tool steel previously used."

Hardening uniformly in very heavy sections from only 1550° F., VEGA cuts heat treating costs—makes special high temperature furnaces unnecessary. Its lower hardening temperature often enables you to eliminate expensive pack hardening to avoid excessive scaling. Moreover, VEGA gives you minimum distortion and size change, good machinability, resistance to decarb, freedom from excessive scaling and excellent toughness with good hardness.

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types of cutting tools for magnesium, but cemented carbide tools should be employed wherever possible, especially on production jobs. Cast tungsten-cobalt tool materials will exhibit tool life between those of high-speed steel and cemented carbide. Life of high-speed steel tools is improved if carbon content and hardness are maintained high. Surface hardening treatments or chromium plating will greatly improve life of most high-speed tools used on magnesium alloys.

Tool Grinding: Cutting tools may be rough ground with medium-grain wheels, but finish grinding should be done with fine wheels. Finishing cutting tools with a fine-grain wheel will give smooth tool faces and provide good cutting edges. Aluminum oxide 100-grit silicon carbide or 200 to 300-grit diamond wheels should be used for finishing cemented carbide tools. Honing or lapping the cutting tool will give sharp edges, smooth surfaces, and improved tool life. This practice may also be used to recondition slightly dull tools. Tools should not be run to the full extent of their possible life, but should be resharpened when slightly dull to maintain good cutting edges and to conserve tool material.

Cutting Fluids: The purpose of cutting fluids when machining magnesium is primarily to cool the work and reduce the fire hazard. Improvement of surface finish and increase in tool life obtained when cutting fluids are used on other metals are of minor importance in the machining of magnesium. While machining heat may be reduced by correct tooling and machining technique, it is often of such intensity that application of cutting fluids is necessary. Examples of cases where cooling should be employed are the machining of irregular shapes or thin sections which might easily be distorted, and multitool setups which tend to create much local heating.

Efficient machining practice demands that high cutting speeds be used wherever possible. At high cutting speeds, a fire hazard sometimes exists, particularly when fine chips are being produced. Although sharp tools greatly reduce this hazard, and cutting feeds must be in the range of 0.001-in. and less to start fires, uncertainties in operations make it necessary to take precautions.

Iron or steel inserts and sand cast surfaces which are apt to spark when hit with a cutting tool also add to the fire hazard. A stream of cutting fluid, of 4 to 5 gpm per tool, is sufficient practically to eliminate the fire hazard. If a particular job or machine tool prohibits the use of a cutting fluid, cutting speeds should be reduced to below 500 ft per min, and the recommendations regarding sharp tools and feeds rigorously followed. In all machining operations where a low cutting speed is used, magnesium may be safely machined without a cutting fluid, but safe practice dictates that high cutting speeds require cutting fluids.

A wide variety of mineral oil cutting fluids will function satisfactorily on magnesium. Almost any oil will materially reduce the fire hazard if applied in sufficient quantities, but to secure adequate cooling, the cutting oil must have a low viscosity. Since low viscosity mineral oils usually have low flash points, a fire hazard due to the oil is encountered. This fact necessitates a compromise between cooling power and flash point. Table XIV presents the range of properties of the most satisfactory cutting fluids.

Additives which decrease the surface tension and increase the wetting power of the cutting fluids are beneficial. The same chemical nature of magnesium makes it necessary that the free acid content of cutting fluids be below 0.2 per cent and that the use of vegetable or animal oils, which may oxidize and increase the acid content, be restricted. Water soluble oils, oil water emulsions, or water solutions of any kind, although good coolants, should not be used on magnesium. Water will greatly intensify any chip fires which might accidentally be started and also make reclamation of machine scrap very inefficient. The presence of moisture on turnings causes the generation of small amounts of hydrogen which present a definite hazard during shipment or storage. Experience has shown that the use of water base cutting fluids on magnesium is dangerous.

Distortion: Distortion of magnesium parts occurs infrequently during machining and usually can be attributed to heating of the part or to improper chucking. Heating of the work is increased by the use of dull or improperly designed tools and very fine cuts. The high thermal expansion of magnesium alloys results in an increase in dimensions as a result of this heating. This condition must receive special attention to control dimensions accurately, especially on thin sections where the heat will cause a large rise in temperature. The use of sharp, properly designed tools and relatively large feeds and depths of cut usually prevents excessive heating. An adequate quantity of cutting fluid also will remove the heat developed in cutting and eliminate thermal expansion. Large or massive magnesium parts usually have sufficient mass to absorb machining heat without an appreciable temperature rise, but wide variations in room temperature during machining will cause excessive thermal expansion.

The fact that magnesium will spring more easily than most metals makes it essential that parts be chucked in such a manner that the clamping pressure is applied to heavy sections and that the pressure is not great enough to cause distortion. Special attention should be paid to light parts which might easily be distorted by chucking or heavy cuts.

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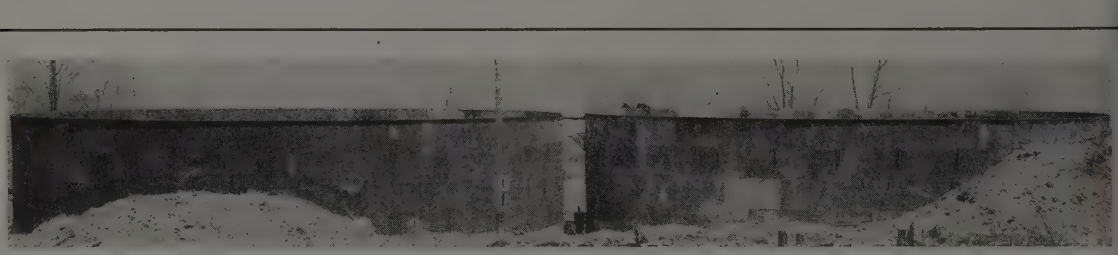
11. Light Metal Age, 2 (No. 1) 1944
12. Data are based largely on information supplied by Dow Chemical Co.

(Continued in later issue)



WROUGHT IRON TANKS: These wrought iron 35,000 bbl storage tanks which served for more than 50 years in the Ohio and Pennsylvania oil fields were purchased by Dow Chemical Co., dismantled, shipped to Marysville, Mich., and the plates used in construction of a new all-welded tank. The tanks are believed to have been of 7-ring construction, approximately 85 ft in diameter and 25 to 27 ft in shell height. First ring was composed of 3/8-in. plate; second and third rings, 5/16-in.; and remaining rings and bottoms, 1/4-in. Plates are reported to have shown no appreciable damage, although it was difficult to find any evidence of paint on the metal surface. Tank bottoms evidently never had been painted. Courtesy A. M. Byers Co.

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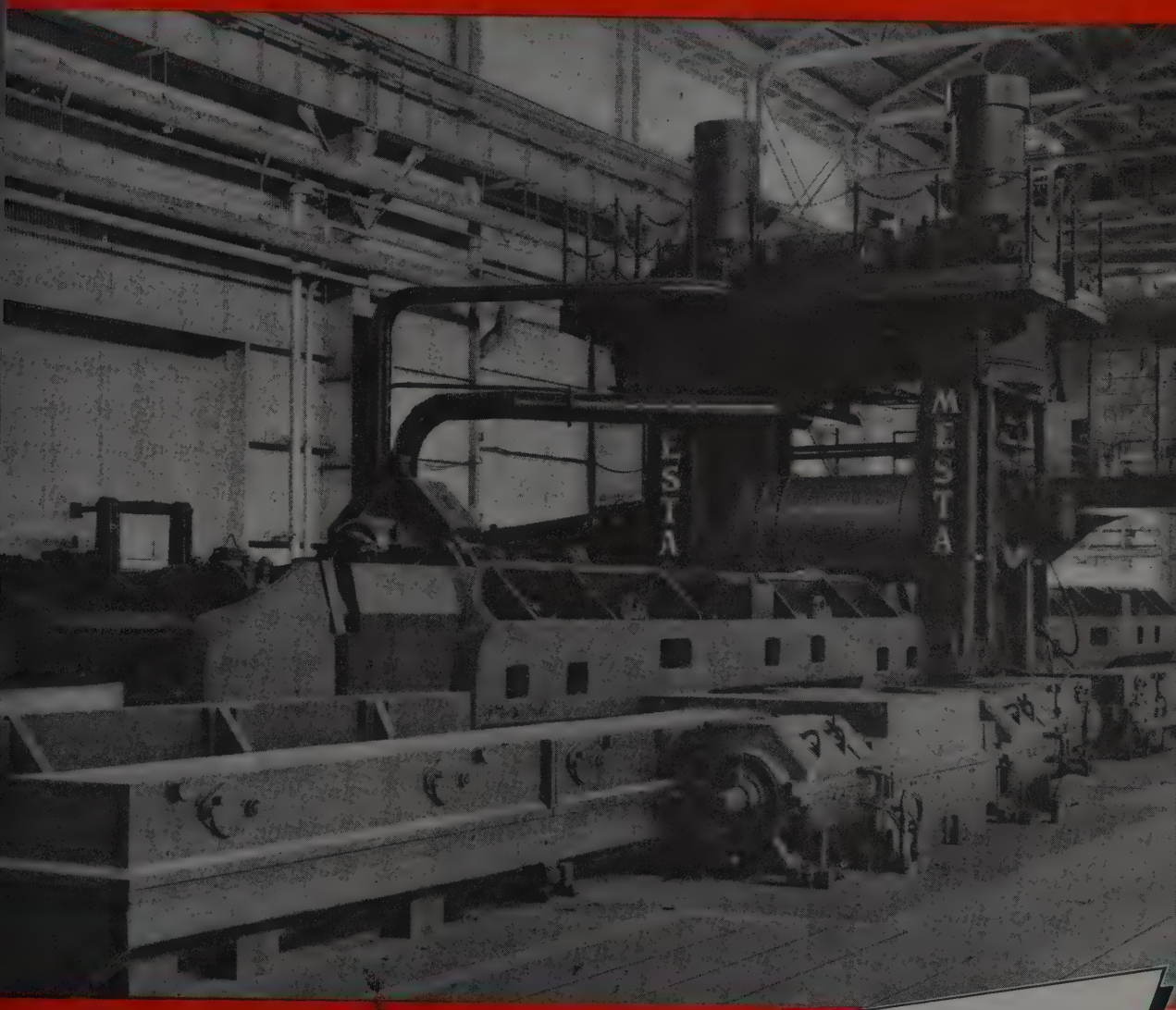

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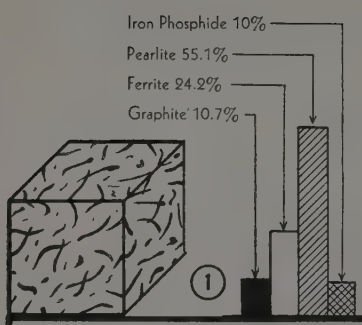
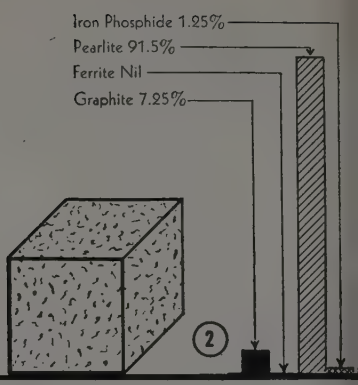




By O. SMALLEY
President
Meehanite Metal Corp.
New Rochelle, N. Y.

A Permanent Mold Material

. . . provides consistent uniformity of metal structure

DEVELOPMENT of fields for application of permanent mold castings was stimulated greatly by the unusual demands of wartime production. Many improvements were made, not only in the production of the castings themselves, but in mold materials and design.

Value of permanent molds is measured in terms of length of service life, type of surface finish transferred to the product being manufactured, machinability, freedom from distortion and dimensional changes and resistance to heat checking. Because many industrial applications of Meehanite castings required similar properties, the material is now used widely for permanent molds.

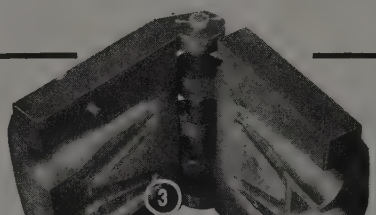
Industry is offered the following classifications: 1. General engineering castings (tensile strengths—30,000 to 55,000 psi); 2. wear resisting castings (brinells—240 to 550); 3. heat resisting castings (nonscaling and nongrowing up to 1600° F); 4. corrosion resisting castings (according to requirements).

Perhaps the chief advantage of Meehanite is consistent uniformity of metal structure throughout variations of casting section. This uniformity insures dependability and freedom from structure failures. To understand this structural property of Meehanite cast iron, it is necessary to examine some factors whic influence the mechanical and physic properties of all cast ferrous materia

During cooling in the mold, iron co taining between 2.50 and 4.00 per ce carbon generally solidifies to form o of the following types of structure: T carbon present may be (1) wholly graphitic condition, (2) wholly in co bined condition, and (3) partly in co bined and partly in graphitic conditio In those cases where the carbon occu as graphite, the material is actually mechanical mixture of graphite in matrix of ferrite, or of ferrite and mentite—depending whether or not co bined carbon is present. The flakes graphite appearing as black streaks a in reality thin saucers which occur in planes and intersect one with another form continuously interlocking graph structures, giving rise to a relativ porous structure.

The flakes lie at all angles and in directions, the thickness of the stre in the photomicrograph indicating angles at which the section interse the flakes. In some grades of iron c ings the graphite occupies from 10 13 per cent of the volume of the casti Fig. 1 shows in three dimensions

(*Please turn to Page* 158)



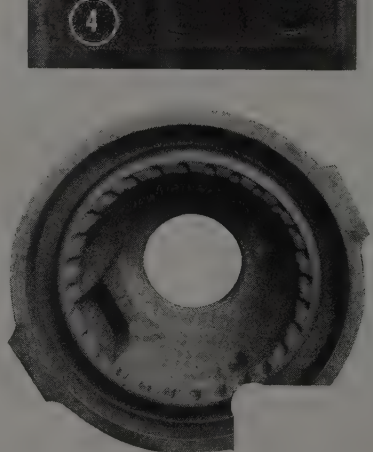


Fig. 1—Interlocking graphite structure of certain cast iron

Fig. 2—Controlled graphite structure of typical Meehanite

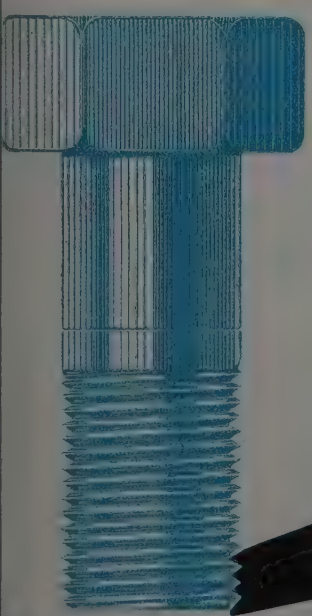
Fig. 3—Meehanite permanent mold for bronze. At the time of the service report this mold had produced 11,000 castings, and was still in good usable condition

Fig. 4—Type GB Meehanite shows almost c plete freedom from surface checks under M naflux inspection after repeated heatings coolings

Fig. 5—Male and female portions of a com permanent mold assembly for aluminum casti

The quality of metal fasteners is always measured by

PERFORMANCE



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New 80-Inch Cold Mill Installed by English Steelmaker

SYMPTOMATIC of the extension and development of the steel industry of Great Britain is a new 80-in. cold reduction reversing strip mill, which is being run in at John Summers & Sons, Ltd. Hawarden Bridge works, Shotton, near Chester. This new mill, the first important unit to be installed since the war as part of the company's pre-determined expansion program, will assist in increasing the efficiency of production of wide high-quality sheets, such as those demanded by the automobile industry and other users of wide sheets.

The mill is a 4-high reversing designed to cold reduce hot-rolled pickled strip up to a maximum width of 74 in. It is equipped with tension reels fore and aft, and with a cone-type uncoiler and pinch roll feeder on the entry side. A maximum coil weight of 10 tons can be handled.

Each housing, of cast steel, weighs approximately 75 tons. The two housings are accurately spaced, and rigidly connected by a heavy cast-steel separator at the top; they are bolted down to heavy cast-steel shoe plates carried on reinforced concrete foundations. Work rolls are 20½-in. diameter of forged steel, rotating in Timken bearings. The back up rolls are of alloy cast steel 53 in. diameter. These rotate in Morgoil bearings and are carried in heavy cast-steel chocks. Pressure is maintained between the top work roll and the top backup roll by hydraulic cylinders mounted in the lower work roll chocks. The rams of these cylinders thrust against the upper work roll chocks. Pressure also is maintained between the top backup chocks and the mill screws by a similar arrangement of hydraulic cylinders and rams in the lower backup chocks. All roll assemblies are withdrawable from the open side of the mill.

Mill screws are 18 in. diameter. The screwdown gear is operated by two 50 hp motors as one unit through the medium of a magnetic clutch coupling the two motor spindles together. Work rolls are driven, through short universal spindles and a pinion stand, directly by a 2500 hp, 93/186 rpm, dc motor.

Two collapsing reels are each drive by two 500 hp, 200/675 rpm, dc mo tors in tandem through a 3.86/1 reduction gear.

The loads imposed by the strip tensio on the reels are carried directly to th mill housing. All drives have been d signed to keep inertia to a minimum

Mill motors are supplied with pow from a motor-generator set comprisi a 3900 hp, 500 rpm synchronous mot taking current at 6.6 kv driving a 22 kw 600 v main generator and two re booster generators of 456 kw ±338

The main mill control is on the Wa Leonard system. Preset and accura control of strip tension is ensured throu the use of Metadyne control.

The pinion stand and the reel ge reduction units have independent

(*Please turn to Page* 160)

Fig. 1—Entering end of 4-high re versing cold mill

Fig. 2—Exit end of mill

Fig. 3—Side view showing contro bench at right

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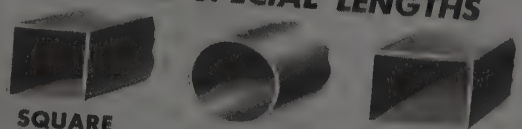

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New Standard on TOOL LIFE

Latest standard for evaluating single-point cutting tools outlines methods for determining cutting-speed tool-life relationship; factors involved in finding tool life in facing tests based on increasing speed. It also presents other data pertinent to the expected performance of cutting tools

By O. W. BOSTON
Chairman
Department of Metal Processing
University of Michigan
Ann Arbor, Mich.

WHEN is a tool dull? Which of several types of tools are superior? What is meant by machinability? These are questions on which there are many different opinions.

The recently approved American Standard on life tests of single-point tools made of materials other than sintered carbides is an attempt to provide an answer to these questions and to outline specifically a method for evaluating single-point cutting tools for use on such machine tools as lathes, turret lathes, boring mills, planers, and shapers. Because carbide tools fail or wear somewhat differently from those of steel and cast nonferrous alloys, a separate procedure for rating them is being developed.

By "machinability" is meant the ability of a metal to be machined satisfactorily or the ability of a cutting tool to perform satisfactorily, or even the ability of a cutting fluid to facilitate the cutting operation. Good machinability implies satisfactory results in machining. It is manifest by any one or a combination of several results as follows: (a) Long tool life or high productive capacity; (b) good surface quality of the machined surface; (c) well broken-up chips which are easily disposed of; (d) low power consumption in removing a given quantity of material; (e) uniformity in dimensional accuracy of successive parts.

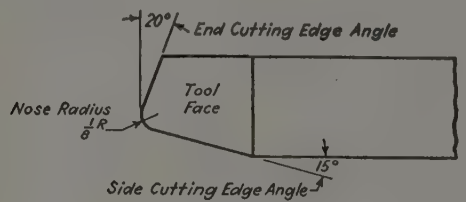
The performance of a cutting tool is definitely associated with the material being cut and the cutting fluid being applied. Its performance is a function of its material, its shape and size. Machinability is not a basic standard but is relative. The rated machinability of two or more tools may vary for different processes of cutting, such as heavy turning, light turning, or forming, as well as for other processes.

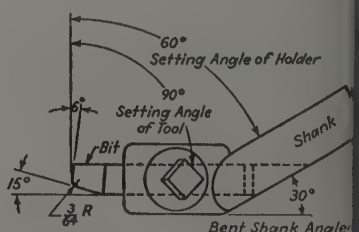
The purpose of the new American Standard is to present a means by which the wear on a tool can be used to determine its life between grinds so that different agencies can evaluate various tools and have their results comparable. The standard has been prepared to provide a wide range of testing conditions to meet as nearly as possible the actual cutting conditions required of the tools.

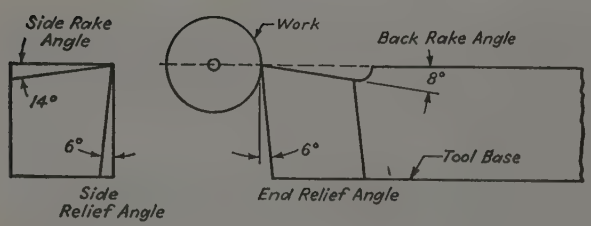
Variable Factors: Certain variable factors are involved in each test: (a) The machine tool—its type, size, condition; (b) material cut—its analysis, structure

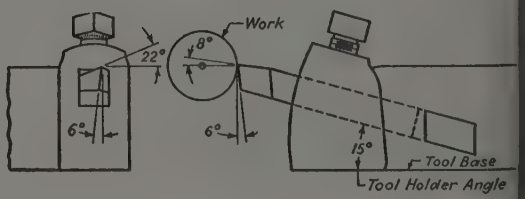
Fig. 1—Typical solid tool of highspeed steel ground for heavy turning steel of about 250 to 300 brinell

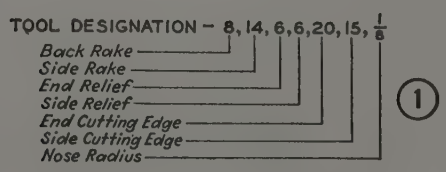
Fig. 2—Typical tool holder with 30-degree left-bent shank and 15-degree tool holder angle. A right-cut tool bit ⅜-in. square of high speed steel for turning soft steel is shown

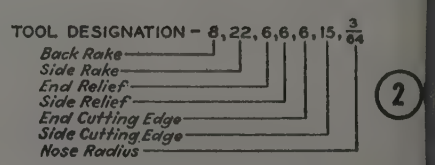












Welded Design Cuts Machine's Cost 60%

BY H. H. STAHL, DISTRICT MANAGER AND WELDING ENGINEER, THE LINCOLN ELECTRIC CO., BOSTON, MASS.

A striking example of a present-day trend in machine design is the evolution of a strawboard shear machine made by Hobbs Manufacturing Co., Boston, Mass.

Redesign of this machine for fabrication by electric arc welding resulted in a machine with a weight of only one-third that of the original and costing 60% less to produce.

In the former design (see Fig. 1), the various parts of the shear were made in individual pieces and had to be hand-fitted, drilled and bolted. All of these operations were eliminated by the welded design (see Fig. 2), which utilizes rolled steel in standard angles and plate sizes.

THE DESIGN PROBLEM

In changing over the design to welded steel construction, the manufacturer analyzed the load requirements of the frame which consists essentially of four legs acting as columns and braces acting as beams. Resistance to deflection was the main consideration.

FIG. 1—OLD DESIGN. *This shear was made in individual pieces that had to be hand-fitted, drilled and bolted. Line production system was impossible.*

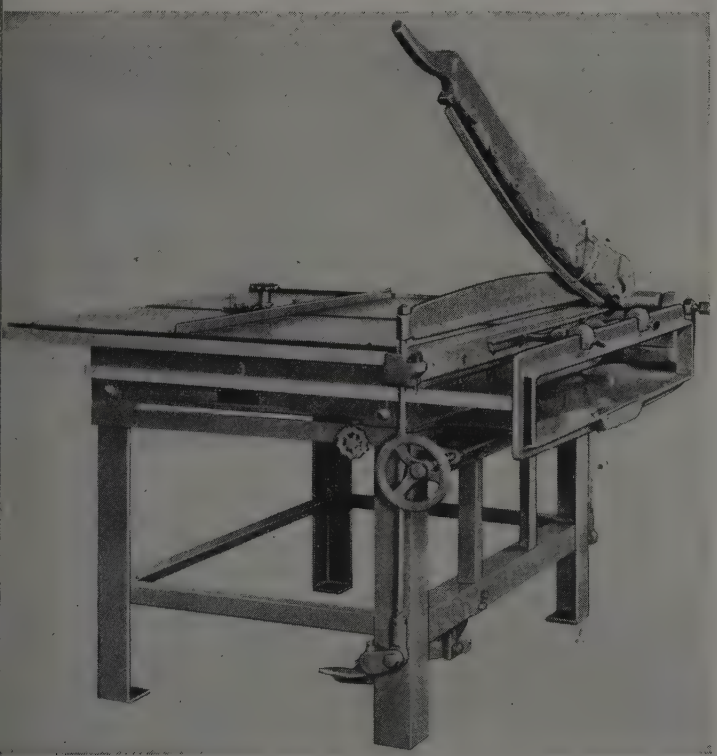


FIG. 2—WELDED DESIGN. *Hobbs engineers redesigned the shear for fabrication by arc welding. The new machine costs 60% less, weighs two-thirds less and is made by line production methods.*

For example, in studying the problem in light of the usual beam formula (see Page 496, 8th Edition, Lincoln Procedure Handbook), comparison can be made of the size of steel angles needed to replace the old material.

In simple designs such as this, however, the common sense formula, based on experience, should prevail. Sizes of members should be governed also by uncalculable demands of handling and shipment, when the machine often gets its roughest treatment.

PRODUCTION PROCEDURE

The simple angle iron and plate design of the frame (see Fig. 2) permits a standardized line production. Angles and plate are shear cut to size, are fitted up in a simple welded fixture and tack welded. All joints are fillets or square butts, requiring no bevelling. Tacked assembly is then placed in a positioner and finish welded . . . all joints downhand for maximum speed. A little grinding off of corner welds of top table and drilling for attachments is all the machining that's required.

A series of Studies in Machine Design are published by The Lincoln Electric Company and are available without charge to engineers and designers. They may be obtained by writing The Lincoln Electric Company, Dept. 152, Cleveland 1, Ohio.

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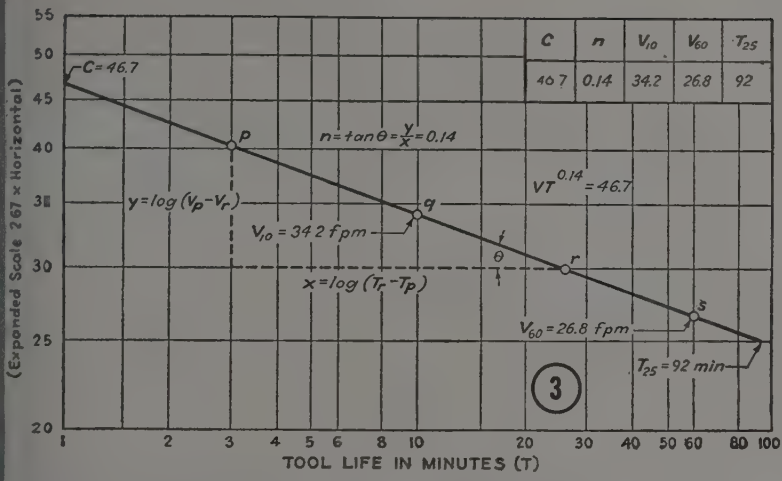


(Cuts in annealed SAE 2340 steel were dry at 0.200 in. depth and 0.050 in. feed with high-speed-steel tools of the 8, 22, 6, 6, 6, 15, 3/64 shape. The log-log scale has a vertical scale 2.67 times the horizontal.)

Fig. 3—Cutting-speed tool life line for turning with single-point tools, as determined from experimental tests as at p, q, r, and s

rdness, strength, size, and rigidity; (c) ols—material, treatment, and shape; cutting fluid—class, properties, meth- of manufacture, and application; (d) e of cut (depth of cut and feed) and shape.

Each of these variable factors is dis- ssed below to indicate what informa- n is intended in order to compare the t data with data obtained elsewhere.

Single-Point Tools: Single-point tools ay be of a solid, bit, or tipped type. lid tools, Fig. 1, are those in which the int of the tool is of the full shank sec- n and consists entirely of metal-cut- g material. Tipped tools are those in hich a relatively small piece of metal- tting material is attached to the tool int to form the cutting edges and face. t tools have relatively small pieces of ol material, or small tool shank mate- l tipped with cutting tool material, mped to a shank or tool holder, Fig. 2.

In compiling the test data, the cutting ols shall be specified as solid or tipped. tipped, the method of attachment and e material of the shank should be giv- . All materials are to be described lly. The supporting surface quality d area, the fit of tool to holder, and ethod of clamping should be described. he clamping method, whether single- int bearing or a setscrew on a pad, ould be specified. The amount of over- ng should be limited to the width of e tool bit.

The shape of the tool point must be ecified. Tool angles and data such as ck rake, side rake, end relief, de relief, end-cutting-edge angle, de-cutting-edge angle, nose radius, tting angle, chip-breaker groove or shelf, grinding wheel used, and type of machine, together with lapping or honing practice, should be given in detail. It is suggested that the tool point nose have a 1/32-in. flat at a 45-degree chamfer, a radius of at least 1/32-in., or a sharp point. In any event, the radius should be measured and recorded as this is an important factor influencing tool life. The cutting edge should be placed on the center line of the work.

A convenient key as to tool shape of the bit type shown in Fig. 2 is as follows: 8, 22, 6, 6, 6, 15, 3/64. This means that the tool has 8-degree back rake, 22-degree side rake, 6-degree end relief, 6-degree side relief, 6-degree end-cutting-edge angle, 15-degree side-cutting-edge angle, and 3/64-in. nose radius. The setting angle is 90 degrees when the axis of the tool shank is at right angles to the axis of the work. The tool holder angle should be specified. The nomenclature of a solid-type tool for heavy cuts is shown in Fig. 1

Machine Tool: Under "machine tool" should be listed information as to:

(a) Type
  (1) Engine lathe, turret lathe, etc.
  (2) Manufacturer, model, and age.
(b) Condition—type of bearings for spindle mounting, runout, and state of repair.
(c) Capacity or size—swing over the ways, distance between centers, bar-stock size, maximum length to be turned.
(d) Method of power transmission—belt drive to step-cone pulley, belt drive to constant-speed pulley, geared head, direct motor drive, etc.; size and type of motor.
(e) Speeds available—in spindle revolutions per minute.
(f) Feeds available—in inches per revolution.
(g) Tool mounting and work-holding means—types of support, method of holding the tool and setting its nose on center.

Material Cut: For the material cut, information should be given as to:

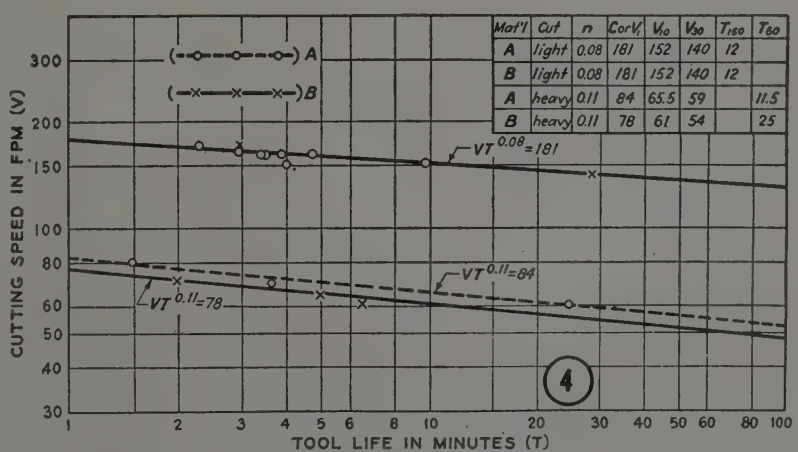
(1) AISI, SAE, WD, NE, etc., types or chemical analysis and an indication of whether the workpiece is a laboratory specimen or a production part.
(2) Thermal treatment (normalized, annealed, quenched, and tempered).
(3) Scale or surface condition
  As-forged, as-cast, or as-rolled (cleaned, pickled, blasted, hot-rolled, or cold-drawn).
(4) Physical condition
  Grain size and structure—microstructure.
(5) Physical properties

Tensile strength	Reduction of area
Yield point	Elongation
Impact	Work-hardening capacity
Hardness	

(6) Shape and rigidity, continuous or intermittent cutting.

If test logs are used instead of commercial work, then the size of the test piece must be adequate to assure rigidity and avoid chatter.

Size of Cut: It is known that tools


Mat'l | Cut | n | Cor V_1 | V_{10} | V_{30} | T_{150} | T_{60}
A | light | 0.08 | 181 | 152 | 140 | 12 |
B | light | 0.08 | 181 | 152 | 140 | 12 |
A | heavy | 0.11 | 84 | 65.5 | 59 | | 11.5
B | heavy | 0.11 | 78 | 61 | 54 | | 25
(-o-o-o-o-) A
(-x-x-x-x-) B
$VT^{0.08}=181$
$VT^{0.11}=84$
$VT^{0.11}=78$
4
CUTTING SPEED IN FPM (V)
TOOL LIFE IN MINUTES (T)

(Both steels were quenched and tempered to give a Brinell hardness of 363. The tools of high-speed steel are described in the text. Two cuts were made dry—a light one with a feed of 0.0127 in. and a depth of cut of 0.0125 in., and a heavy one with a feed of 0.0127 in. and a depth of cut of 0.100 in.)

Fig. 4—Tool-life cutting-speed relationship in turning two forging die steels known as A and B

compared when taking light cuts are not necessarily arranged in the same order of merit as when taking heavy cut. These cutting conditions must be varied then as follows:

(a) Light, intermediate, or heavy cuts on materials which give discontinuous chips such as cast iron
(b) Light, intermediate, or heavy cuts on materials which give continuous chips such as steel
(c) Size and shape of cuts, tools, and cutting fluids, and materials for general purpose work
(d) Cuts, tool materials, cutting fluids, and materials for a specific commercial job

Depths of cut and feed in inches per revolution suggested for light, intermediate, and heavy cuts are: (1) Light cuts, 0.010-in. depth by 0.002-in. feed, (2) medium light cuts, 0.100-in. depth by 0.0125-in. feed, (3) medium light cuts, ⅛-in. depth by 0.020-in. feed, (4) medium light cuts, 3/16-in. depth by 0.010-in. feed, (5) heavy cuts, ¼-in. depth by 0.030-in. to 0.05-in. feed.

Test for Cutting-Speed Tool-Life Relationship: In a test to evaluate tools, materials, or cutting fluids based on the relation between cutting speed and tool life, there should be but one variable, namely, the material, the tools, or the cutting fluid. If it is the tool material that is under consideration, then the material cut and the cutting fluid should be kept constant, together with the shape of the tool and size and shape of cut. For each class of material machined there is naturally a tool form best suited for the purpose.

For the tool material tests, for example, the following should be kept constant: (1) Tool shape, (2) depth of cut and feed in inches, (3) setting angle of the tool, (4) analysis and heat-treatment of the material being machined, (5) type of cutting fluid used; dry cutting is included as a cutting fluid.

There must be a number of specific tests outlined, so that that particular test which most nearly reproduces the commercial conditions under which the tools are to be used may be selected. The cutting speed should be measured on the uncut work surface ahead of the tool. It should be recorded in feed per minute. There are two general methods now in common use for obtaining machinability ratings based on tool life:

(1) Obtain the tool life when cutting under standardized conditions at a constant cutting speed, as in turning cylindrical test bars.

(2) Obtain the tool life when cutting at a uniformly increasing cutting speed, as in facing.

In the facing tests, the cutting speed usually increases uniformly as the cut proceeds from the center of the work. The tool usually fails by virtue of very high temperatures caused by the constantly increasing speed. There is as yet no satisfactory relationship between the tests based on facing with increasing speed and those in turning with uniform speed.

How to Find Tool Life in Facing Tests Based on Increasing Speed: For the first type, the tool life for total failure for each of four to eight tools of a type or shape is to be obtained for several different cutting speeds, in accordance with the following procedure: The formula expressing the relation between cutting speed and tool life between grindings for a given tool, material, cutting fluid, feed, and depth of cut is

$$VT^n = C$$

where V = the cutting speed in feet per minute.

T = the tool life or duration of cut between grindings in minutes

C = a constant depending on the specific conditions, and equals the cutting speed for a tool life of 1 min

n = the slope of straight line that appears on the log-log paper.

If four or more turning tests were run on a metal in which all factors were kept constant except the cutting speed V, a definite value of tool life at failure T would be obtained at each cutting speed as indicated by points p, q, r, and s on the curve in Fig. 3. These and more points plotted on Cartesian co-ordinates would indicate a hyperbolic curve. On log-log paper they produce a straight line[1].

In Fig. 3, y as scaled should be divided by 2.67, as in this case the vertical ordinate scale is 2.67 times the horizontal to exaggerate the slope. When T = 1 then C = V_1 (46.7 feet per minute for a 1-min tool life). V_{10} (the cutting speed in feet per minute for 10-min tool life) as read from the curve is 34.2, V_{60} is 26.8 whereas T_{25}, the tool life for the cutting speed of 25 feet per minute, is 92 minutes. These values, or similar ones needed to compare this curve with another, are summarized in Fig. 3.

Tool Failure: Single-point tools in continuous cutting may fail by: (a) Abrasion or wear on the flank below the cutting edge, (b) wearing a cup in the tool face back of the cutting edge which becomes steadily larger and finally causes the cutting edge to crumble, (c) combined flange and face wear.

Sometimes before the complete breakdown of the tool or ultimate failure, there is what is called a preliminary failure. By preliminary failure is meant the failure of a small portion of the cutting edge. This may occur on the end of the tool such as on the nose radius, and change the quality of the machined surface. To avoid preliminary failure, either the nose radius may be reduced, the side cutting edge angle increased, or the shape of cut changed. In this way it is possible to prevent the failure from changing the quality of the machined surface and have

(*Please turn to Page* 162)

SUGGESTED DATA SHEET FOR CUTTING-SPEED TOOL LIFE TESTS IN TURNING
(These data are plotted in Fig. 4 to form the two highest lines)

Tools: ⅝ in. square × 3 in. long, high-speed steel (RCS)
Material cut: Die steels A and B forged log 6 in. diameter × 20 in. long, 363 Brinell
Depth of cut: 0.0125 in. Feed: 0.0127 in. per revolution
Tool angles: Date: 6/4/38

Back rake angle, deg	8
Side rake angle, deg	14
End relief angle, deg	6
Side relief angle, deg	6
End cutting edge angle, deg	6
Side cutting edge angle	15
Nose radius	3/64 in.
Setting angle	90 deg
Back slope of bit in holder	10½ deg

Observer's name: .....
Tool support: Special solid tool holder 1½ inches × 2½ inches × 4 inch
Cutting fluid: Dry
Room temperature: 75 F

Test Number	Tool Number and Rockwell C*	Work Diameter at Cut	Log Sect†	Cutting Speed, fpm	Tool Life, in Min	Cutting Fluid, Temperature	Remarks Nature of Tool Failure and Types of Chips	
5	44T-64	5.650	4	164.8	2.94	.....	Typical cup failure	
6	67T-64	5.650	3, 2	163.8	3.90	.....	Typical cup failure	Die Steel
57	80B-63.5	5.275	3	161.6	4.77	.....	Typical cup failure	
59	45B-64	5.225	3	151.5	9.87	.....	Typical cup failure	
34	78B-64	5.030	4, 3, 2	161.6	4.08	.....	Typical cup failure	
35	75T-64	5.03–5.000	4, 3, 2	141.4	28.27	.....	Typical cup failure	Die Steel
37	64T-64	4.905	4, 3, 2, 4	151.5	10.16	.....	Typical cup failure	

* Tools ground on both ends, one end T, other B.
† 20-in. log divided into four sections of 5 in. each, numbered 1 to 4 from chuck.

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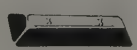
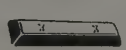


60-lb. pigs for blocking the open hearth heat.



30-lb. pigs for charging the cupola.

12½-lb. piglets (for foundries) no weighing — charge by count.

KEOKUK ELECTRO-METALS COMPANY

KEOKUK, IOWA

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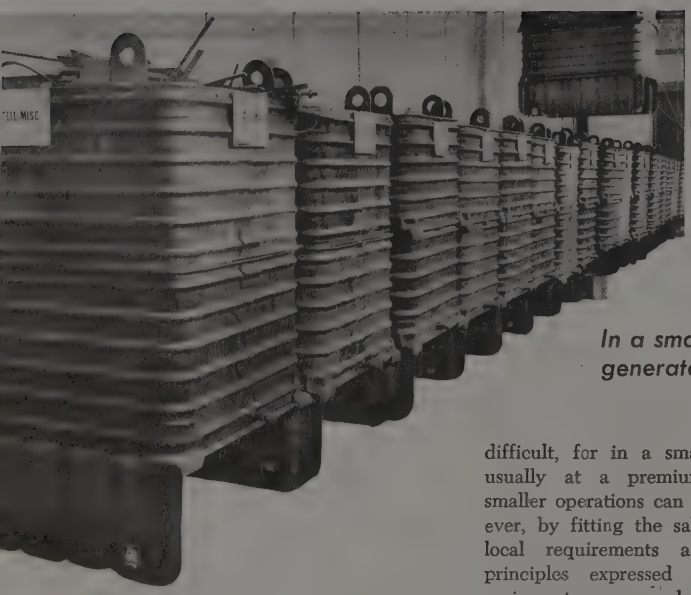


Scrap Salvaging

In a small plant operations are based on kind of scrap generated, bulk and weight, and on demand for different grades of scrap material

BASIC principles governing the handling of scrap are essentially the same whether the manufacturing organization is large or small. Assuming that the shop operations are relatively the same, the major difference is in the volume. In planning a setup for either a small or a large shop, proper consideration must be given to the kind of scrap generated, the bulk and weight of the material to be disposed of, and the demand for the different grades of scrap material. This latter point is very closely related to the volume because the amount of the different grades of scrap created will determine to what extent the segregation is to be carried out.

Generally speaking, large salvage operations are carried on with a fair degree of efficiency and with sizable profits over operating expenses. Operating a small salvage setup with any comparable efficiency is a little more difficult, for in a small shop space is usually at a premium. Efficiency in smaller operations can be attained, however, by fitting the salvage activities to local requirements according to the principles expressed above. In comparison to many plants of Westinghouse Electric Corp., the Baltimore Works is a relatively small manufacturing organization, therefore its salvage operations are a good example of what can be done in a small plant. The scrap shed is a lean-to affair constructed of corrugated sheet metal and is attached to the end of one of the main buildings. A row of bins, with identification cards attached to each bin is shown. Storage bins, Fig. 1, consist of two tubs welded together, with the bottom tub welded to a skid. A sheet metal bottom is seam welded into the bottom of each tub to prevent oil from draining onto the floor. Each bin is provided with a capped drain pipe which can be used for draining off surplus oil. The top of each bin is equipped with "ears" to which chain hooks from the two-ton electric crane can be attached.

A mono-rail system extends down both sides of the shed. At the far end of the building a large door opens out on drive-way. This entrance is so arrange that trucks can back in to a point wher the bins can be dumped directly in th truck from any location in the she Platform type weighing scales are als located on this end and are used t weigh the bins before they are dumpe into the truck. Handling is kept t a minimum.

Scrap bins located on the machir shop floor are constructed to provid adequate container service as well a ease in handling. When the bins ar full, an electric truck picks them up an transports them to the scrap shed. An other important feature of this setu is the fact that the major part of the ma terial segregating operation is conducte in the area where the scrap is generate This is what is called "on spot" segre gation. For a small operation, this said to be most economical because it a part-time job and can be performed b an operator in the machine shop area.

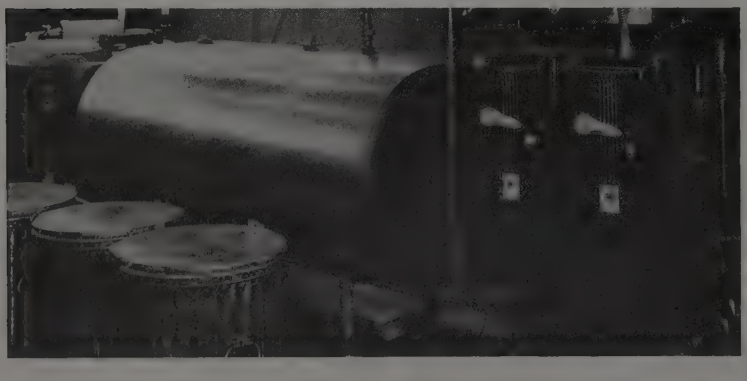
An oil extractor illustrated in Fig. is located in the machine shop are The purchase of this equipment was result of a study made of the consum tion of cutting oils. The study reveale that the shop was using around 9,00 gal of cutting oil per year, at a tot cost of approximately $3000. The maj part of this oil was going out in chi and turnings.

Prior to the purchase of this equi ment, no attempt was made to salva any oil adhering to metal turnings. Th resulted in a double loss because use the oil was first lost in the turnings; a secondly the company lost money some of the chips and turnings becau buyers would not pay full price oil-contaminated scrap.

The oil extractor averages appro mately 75 per cent recovery of oil chips and turnings from operations. Wi this figure, indicated savings amount about $2250 per year. As in the case the scrap bins located in this area, machine shop man takes care of th operation.

Fig. 1 (above)—Scrap storage bins consist of two tubs welded together, with the bottom tub welded to a skid

Fig. 2 (below)—Oil extractor averages approximately 75 per cent recovery of cutting oil in chips and turnings. Indicated savings amount to about $2250 per year



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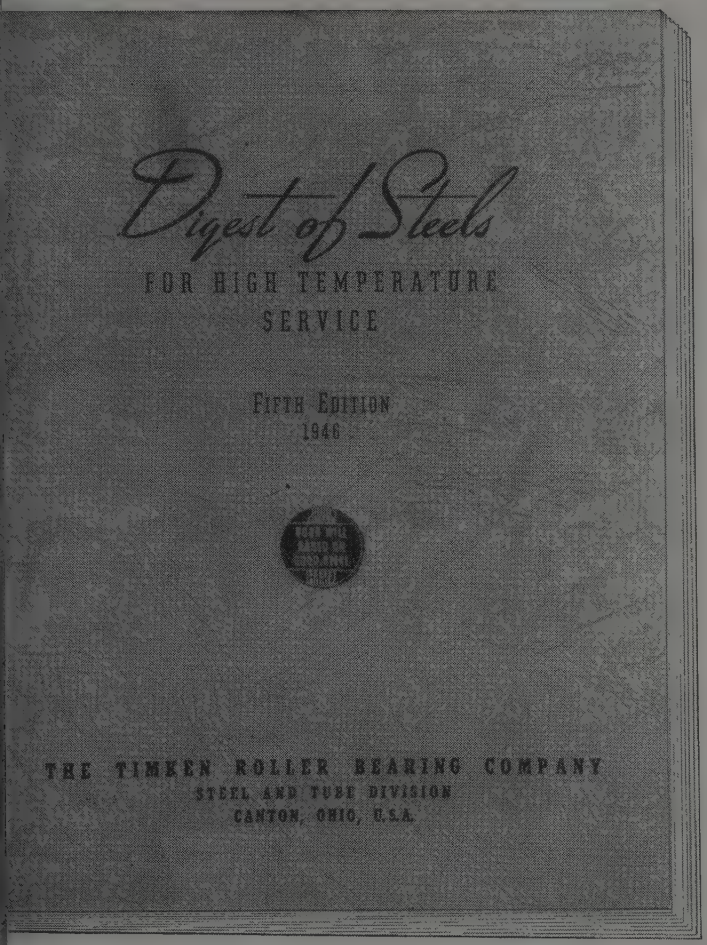

...and here's the latest edition just off the press

ACCEPTED everywhere as the industry's standard guide to high temperature steels, the new, revised Digest details the physical properties of 22 Timken high temperature steels at elevated temperatures.

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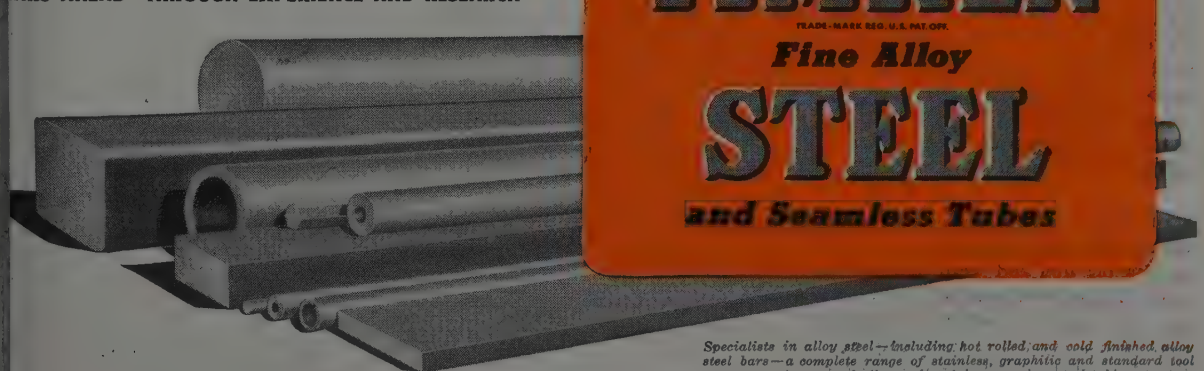


Specialists in alloy steel—including hot rolled and cold finished alloy steel bars—a complete range of stainless, graphitic and standard tool analyses—and alloy and stainless seamless steel tubing.

Engineering News *at a Glance*

MIRROR FINISH FOR ALUMINUM: Aluminum surfaces free of scratches, roll or draw marks, spinning lines and other surface marks may be provided with a bright chrome-like finish by employing a process developed recently by Colonial Alloys Co., Philadelphia. Surfaces of aluminum or aluminum alloys with these imperfections may be made highly reflective except that the imperfections are not entirely removed. Besides the mirror-like surface, the company reports, the treatment passivates the surfaces to render them more resistant to tarnish and corrosion. It also benefits recessed or difficult-to-reach areas untouchable by wheel buffing and polishing. While large surfaces may be treated, small objects such as screws, nuts, bolts, fittings, tubing or extruded parts lend themselves to greater production.

BLOWPIPE "SLICING:" All kinds of shapes in stainless steel may be cut at amazing speed by means of a process, called powder-cutting, developed by The Linde Air Products Co., New York. The process is reported to bring to stainless steel all the advantages of oxygen-cutting carbon steels. Cutting is done at a fast pace by a mechanized blowpipe from which is ejected a stream of oxygen and an oxyacetylene flame as well as a special finely-divided powder. According to Linde, the development represents a valuable tool for metalworkers, one that shortcuts many slow machining operations.

FELT STANDARD REVISED: Implying expanded use of wool felt in industry, the felt standard of the Society of Automotive Engineers is being amended commensurate with postwar commercial practice, as recently coded by makers of the material, according to the Felt Association. Minor changes are being made in weights and thicknesses. Four thicknesses of ball bearing felts replace the eight formerly specified, while the eight former thicknesses of lining felts are being replaced by two. Specifications are now consolidated in one table instead of five, and conform in arrangement with standard government specifications.

SO IS COAL: Scrap is important because open-hearth steel normally is made by melting pig iron and scrap. It could be made 100 per cent from pig iron or 100 per cent scrap and still be top quality steel. But every ton of steel scrap takes the place of 1 ton of pig iron; and to make 1 ton of pig iron requires 2 tons of ore, 1.2 tons of coal converted to about ¾-ton of coke and ½-ton of limestone. Thus to make 90,000,000 tons of steel without scrap would require 150,000,000 tons of ore, 108,000,000 tons of coal and 45,000,000 tons of limestone. There are simply not enough mining, plant and shipping facilities to handle all this tonnage. National Auto Wreckers Association, estimates the industry, in 1941, used 42,000,000 tons of scrap in making about 83,000,000 tons of steel.

SELECTS FOOTCANDLES: To help create a better understanding and appreciation of quantity and quality of lighting with ease and comfort of seeing, General Electric's lamp department at Nela Park, Cleveland, recently devised a vest-pocket footcandle selector that indicates lighting recommendations for more than 75 "seeing" tasks. It lists a variety of lighting applications including those in homes and industry, selecting them simply by a movement of a tiny lever. Selector recommendations are based on more than 30 years of lighting research by the lamp department.

"PANCAKE" MOTOR: Noted among patents available for licensing or sale at the Patent Office, Washington, is a pancake-shaped, universal type electric motor which operates on 110 v. According to the inventor, E. C. Jones of Kansas City, Mo., the motor is noiseless developing a speed of 400 rpm. Its shape makes it applicable to refrigerators and other appliances where storage space is a factor. Listed as patent No. 1,996,023, the motor may be operated for long periods without attention. A feed wick carries oil from a well to the shaft making the motor self-lubricating. It also is reported to use little current, is easy to repair and is self-starting.

MEASURES AS IT "BREATHES": Gas or liquid pressure is converted to electrical energy for measuring, recording or controlling by means of a pressure-sensitive device developed recently by Baldwin Locomotive Works' Southwark Division, Philadelphia. Its extreme accuracy, one-fourth of 1 per cent of full scale, means the device may be used for control operations formerly not possible. It is being made in several ranges up to 0 to 20,000 lb psi. Heart of the device, essentially an electronic unit, is a very fine wire filament wire-bonded to a hollow metal core against which is exerted the gas or liquid pressure. As pressu increases, filament stretches, changing t diameter of the wire and causing measu able changes in the electrical resistan of the wire. Change in resistance var amount of current flowing through t filament circuit and, when amplified, t changes show up on the dial or s used to actuate a control system. Fi ment is sensitive to a "stretch" of t metal core of only one-millionth of inch. This ability to measure gr changes in pressure without any physi movement led to a description of t instrument as being actuated by t "breathing" condition of the metal. T SR-4 device, as it is called, is about 1 in diameter and 5½-in. long.

HAIRLINE ACCURACY: Such cl tolerances are required on modern m tion picture projectors that highly-rat manufacturers of accurate instrume often refused to guarantee that the tol ances indicated on projector bluepri would be met. Hairline accuracy the countless small parts necessitated heat treatment to very close tolerand Thus International Projector Corp. Bloomfield, N. J., was forced to dev machinery and techniques to the j An interesting example of the precis work required in the manufacture o projector, according to "Metal Minut is the star wheel that provides movem of the compact mechanism. This crit part is held to one five-thousandths an inch after heat treating for grindi

DUST TO COMPOUND: Bacteria, mally in the air between sweepings reduced by 97 per cent by a brush manufactured by Milwaukee Dust Brush Co., Milwaukee. The dust "broom" is designed with a reservoi its back to hold a sweeping fluid. Ce row of its tufts is connected with reservoir. During the sweeping pro the fluid feeds through the tufts moistens every particle of dust it tacts. Instead of rising in the air, dust itself is converted into a swee compound said to be more effe than sawdust and many other swee aids.

"ARMOR" FOR "TIN FISH:" M useful information was accumulated i the construction and development military equipment. For example, ing the war, electric torpedoes bec the business of Westinghouse transfe engineers. One of their big "headac

vas the protection of the thin steel shell f the torpedo body from the simultaneus action of sulphuric acid on the inde and salt water on the outside. Inulation against these corrosion agents ame, surprisingly enough, from a highly pecialized electrical varnish—the same ype used in transformers. The steel orpedo shell was Parkerized first, then iven a single dip in the varnish and aked. Result was a baked synthetic-arnish surface that was remarkably brusion-resistant, considering the rough andling to which the missile is subected. Ultra protection of the "armor" oat was indicated when a torpedo was shed out of the sea after 9 months imersion, and found to be in perfect conition.

ROM MISSOURI?: To prove performnce of its odorless, noninflammable plase rack coating, Peninsular Chemical roducts Co., Van Dyke, Mich., is reuesting platers to forward a sample rack or a free trial treatment, returning each ack for testing in the user's plant. The ew coating consists of an aqueous disersion of Saran plastic and contains no rganic solvents. According to the comany, the material is tough, flexible and ighly resistant to all plating and cleang solutions, including chlorinated dereasing solvents. It is applied by hand ipping and dries in less than an hour t room temperature, giving complete rotection in 24 hours. It also is free owing, draining rapidly without formg webs or strands to be trimmed off fter dipping.

ORTABLE "HOT" FLAME: Hot flame or such work as straightening, bending, rinking and expanding, skin drying oundry molds, and for general work n boiler and railroad shops is produced y a portable "packaged" machine curntly coming off Aeroil Products Co.'s roduction lines, in West New York, . J. Any length or type of flame can e produced by the "burner"—6 in. to 5 ft long—from a lazy little flame to long hot one of 2000° F. No special uel is required by the machine; it oprates on kerosene or any oil up to No. 3 uel oil. The unit's two burners make it ossible to work in a vertical as well as orizontal position without affecting volme or density of the flame.

TEAM FOR UNCLE SAM: General pposition is that the proper fulfillment f a locomotive's destiny is hauling trains ver a railroad. Unexpected circumtances, however, do arise. Late last ear during the Pittsburgh power strike, uch an instance occurred when a Baldwin-built Pennsylvania Railroad steam reight locomotive was called into service as a temporary heating plant. The city's huge Federal building, which houses the main postoffice, federal courts and scores of government offices, was the scene of operation. Engine No. 7103, built by Baldwin Locomotive back in 1915, was hauled to the edge of the building on one of the four tracks used for handling mail direct from mail cars to the postoffice. Two hundred pounds of steam were built up, and the outlet from the engine was connected into the steam line of the building. It is reported the steam furnished by the locomotive was sufficient, in spite of the building's 2800 radiators, to bring the building to a comfortable temperature.

ACCORDION CONVEYOR "CLICKS:" More proof that manufacturers are greatly interested in flexible methods of handling materials is furnished by Food Machinery Corp. Last year, its Riverside, Calif., division introduced nationally a portable gravity roller conveyor, so flexible it extends from 35 to 100 in. per unit, is easily set up and is capable of being formed quickly into practically any shape. Users found the accordion feature saved time, space, ended aisle jamming and generally reduced overall costs. Sudden interest in the development even surprised the corporation which had tooled up for a comparatively modest volume. To meet the demand, the company recently expanded its facilities and is now making immediate delivery of all sizes. Example of the conveyor's flexibility is that users, in moving sections of the unit about, merely fold up the conveyor, turn it over and use its rollers as wheels.

SCANS FOR FLAWS: Flaws at inaccessible parts of ferromagnetic tubes and pipe may be found and measured with a simple alternating current inductance bridge according to a report held by the Office of Technical Services, Washington. Both bore and exterior surface weaknesses can be located by this method. According to the report, the inductance bridge is coupled to an indicator through an amplifier. One inductance coil is used as a pick-up or detecting coil and the other as an identical compensating coil. The coils are wound on iron cores and are equipped with magnetic shunts of a high permeability nickel-iron alloy. Metal tested is magnetized with a very weak direct current. Flaws located by scanning surface of the metal with the pick-up coil, upset the balance of the bridge and cause the indicator to twitch rapidly. Extent of flaws may be determined by thorough scanning in the defective area. The method was used in nondestructive testing of gun tubes at the Watertown Arsenal during the war.

FREE "LAB" SERVICE: Metallurgists and production men concerned with heat treating may obtain a direct comparison between physical characteristics resulting from salt bath heat treating and those resulting from other methods, without necessity of making large capital investment or obligating themselves or their companies in any way, in this modern metallurgical laboratory, completed recently by Ajax Electric Co. Inc., Philadelphia. Considered a model installation, the lab contains a battery of seven furnaces, with accompanying quench, acid pickling and rinse tanks, and a drying oven—all of commercial proportions—to permit treatment of virtually any normal size work by any process for which salt bath furnaces are used. No charge is made for treating specimens submitted by any bona fide production executive or metallurgist

High Temperature Furnace

(*Continued from Page* 99)

socket joints (for which patents are being taken out) are sufficiently gas tight for practical purposes, additional insurance is given by a luting which has been developed and which becomes plastic at the operating temperature of the furnace, thus lubricating and sealing the joints at all operating temperatures.

Special ring type luminous flame burners had to be developed for firing these tubes at subatmospheric pressures so that if any leaks were to occur, this leakage would be inward to the tube and not from the tube combustion space into the furnace, thus precluding atmosphere contamination and subsequent harm to the charge being treated.

Flame length can be controlled by the designer to give even heating the entire length of the tube and tests have shown that in a furnace 22 ft long, temperatures throughout can be held to a plus or minus of 10° F, thus insuring even heating of the charge.

Overall gas efficiencies are astonishingly high because of the type of flame developed and the material of which the tube is made. Silicon carbide has a black body co-effcient of from 0.90 to 0.95 at all temperatures, which is exceptional. There is no tendency for a heavy insulating layer of oxidized material to form on either the inner or outer surface of the tube no matter how high temperatures are driven, which would inhibit the absorption, conduction and emissivity of the heat.

Silicon carbide tubes have been found to be such an excellent media for the transfer of the radiant heat of the enclosed gas flame that the heat transfer can be explained only on the basis that the material possesses an extremely high heat conductivity. Also the silicon carbide apparently aids the combustion. Thus in a 4 in. ID tube at a temperature of 2200° F natural gas can be burned at the rate of 175 cfh with an Orsat analysis of carbon dioxide, 11.6 to 11.5 per cent; oxygen, 0.0 to 0.5; and carbon monoxide, nil. While this high rate of fuel consumption and consequent high rate of heat transfer may be due in part to the special type of burner which has been employed nevertheless the effect of the burner will not explain why the same tube and burner, at lower temperatures (1500 to 1800° F) and with the same Orsat analysis, will burn gas at the same pressure at the rate of 220 cfh. Normally one would expect that the rate of gas consumption would fall off at the lower temperatures. Whatever the explanation for this phenomenon may be, the ability of the silicon carbide burner tubes to handle larger quantities of gas when cold has been most useful in bringing furnaces up to operating temperatures relatively quickly.

Exceptionally long life for the tubes is indicated because the tubes which have been used experimentally for over two years show no signs of deterioratio after intermittent firing up to 2650° F Testing these tubes to destruction is n possible because of the inability of g flame temperatures to reach the nece sary heights. The only service which in any way analogous is the use of Carb frax tubes in Fitch recuperators in whic service, with higher heat differential the life is from five to ten years. Ther fore, this life expectancy at such tempe atures will open fields for the consum tion of gas which has not been enjoye before.

This will give the gas industry e trance to the fields of copper brazin bright forging, sintering of powdere metals, heat treatment of permane magnet metals, high temperature anne of high silicon electric steel, malleabli ing and many other of the already know applications.

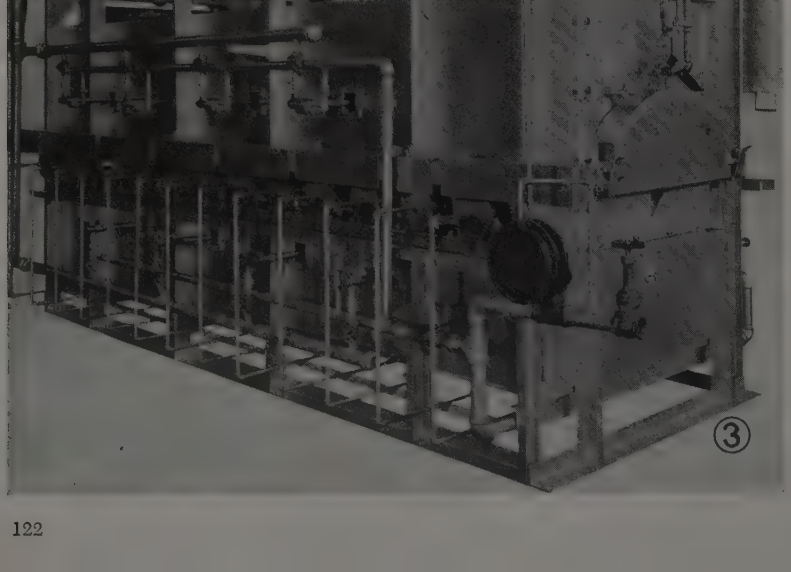
Tube Burners in Roller Furnaces

An example of the expanding fie for silicon carbide radiant tube burne in roller furnaces, such burner tubes w be placed between silicon carbide rolle developed by the Gas Machinery C This is done in order that the radia heat furnished by the tubes may b brought as closely as possible to the wor and also to heat the surface of the rolle so that the rollers may add heat to t work rather than rob the work of he as is usually the case. While this pra tice would seem to invite excessive he loss through the rolls, the resistance such rolls to heat transfer renders t construction most desirable. This ty of roller furnace can withstand hi static loads.

The Gasmaco silicon carbide roller co sists essentially of a tube of silicon ca bide supported concentrically upon hollow steel shaft by high-temperatu insulating refractory. The size of t roller is engineered to load and te perature requirements. At the prese time two general types of insulating fractories are used—one up to 2300° and the other up to 2800° F. Insulati refractories for even higher temperatu for heavy loading are in the process being developed and tested. The holl steel shaft can be varied both as to s and alloy content to meet load requi ments. Its full strength is retained any furnace operating temperature being water-cooled.

Silicon carbide has the property of creased strength of approximately 5 cent at elevated temperatures, reach a maximum strength at about 2500° and not appreciably losing this stren after several hundred degrees incre of temperature. When suitably suppor upon an insulating material in such a v as to eliminate the effects of ther shock and reduce the heat loss to a m

Fig. 3—Roller hearth industrial furnace showing individual intake water lines



MCKEE history covers four decades of engineering and construction in every quarter of the globe. This map shows more than 650 locations in the United States where McKee has supplied design, engineering, construction or equipment for the Iron and Steel Industry and the Petroleum Refining Industry during the past 15 years.
KEY
■ Iron & Steel Plants ● Petroleum Refineries
15 15 Figure in symbol indicates number of contracts represented by that symbol
Arthur G. McKee & Company
★ Engineers and Contractors ★
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30 ROCKEFELLER PLAZA, NEW YORK, N. Y.
McCORMICK BUILDING, CHICAGO, ILLINOIS
McKee activities include almost every country in the world where Petroleum products and Iron and Steel are produced. In recent years McKee has handled more than 250 contracts in the following countries:
Australia
Brazil
Canada
China
Czechoslovakia
England
France
Dutch East Indies
Dutch West Indies
India
Latvia
Mexico
New Zealand
Peru
Poland
Romania
South Africa
Sumatra
Russia
Trinidad
Turkey

mum, it has been found that the silicon carbide has an indicated service life commensurate with the service life silicon carbide has given for years in other furnace parts subject to excessive wear and heat.

Development of the silicon carbide rollers was begun some months ago in an experimental way and patent applications have been made. After thorough laboratory testing, rollers of this type were installed in a production furnace of a Cleveland steel plant. This furnace operates at 2100° F and is used to anneal stainless steel. At the end of the several months' service the rollers appeared to be in good condition.

Because of the surprisingly high hot load strength of the silicon carbide roller when made according to tested construction, the practice of moving the load forward and backward during the soaking period to prevent sagging of rollers can be eliminated with a saving of furnace space and operation difficulties.

The rollers are not subject to sagging and therefore can be operated either intermittently or continuously to suit the job. They provide a means of conveying material through furnaces or kilns at increased efficiency because there is no high sensible heat losses of carriers such as pallets, cars and saggers. The range of temperature, the speed of the material through the furnace and the hearth loads are extended beyond commonly accepted practice and the replacement and maintenance costs are minimized.

Issues Coal Directory

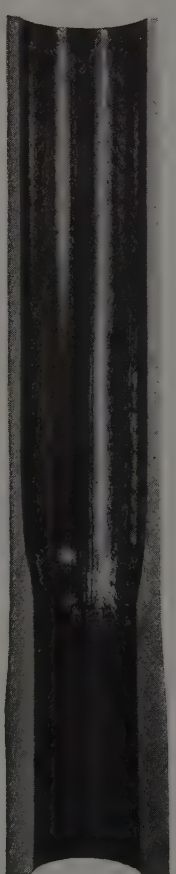
A directory presenting information about the coal and the mines which are located on the Chesapeake & Ohio railway has been published by the railroad. Contents include: Operating companies showing mine name and number; mines, listed alphabetically; geographical arrangement of mines, divided by producing districts and each with a map; sales agents; C & O coal loading statistics; and personnel of coal operators associations and the railroad's coal traffic department. Many photographs and large 5-color map are included in directory, available from the C & Cleveland office.

Test to Determine Thermal Conductivity

To provide more accurate and depe able values of thermal conductivity most insulating materials on the m ket, the Committee on Research American Society of Heating & Venti ting Engineers is instituting a program be carried out by Technical Advis Committee on insulation. Laborator having acceptable equipment are be sent a sample of insulating mate which, after testing, is sent to Natio Bureau of Standards for re-testing determine basis of ability of laborator to check with acceptable tolerances.

A list of acceptable laboratories w be made available to manufacturers insulating materials and they will urged to have their products check

Plastic Coated Drill Pipe



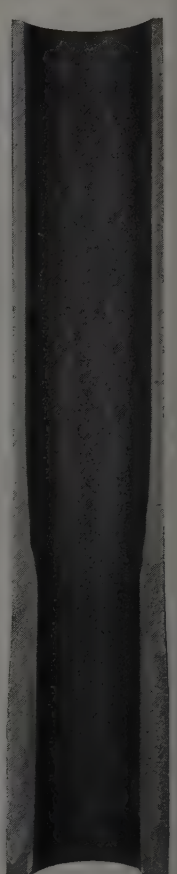
. . . prevents development of corrosion fatigue cracking

MANY pipe failures caused by corrosion pitting during oil well drilling are now being prevented by the use of a thermo-setting plastic coating, intermittently tested over the past few years.

According to Dr. L. E. Trishman, chief research engineer of Spang-Chalfant division, National Supply Co., Pittsburgh, corrosion pits or any other surface notches act as stress raisers in rotating or highly stressed machine parts. To prevent corrosion pitting a coating would have to be impervious to oil and water, resist comparatively mild chemical attack and remain chemically stable itself. It would have to withstand temperatures as high as 400° F, resist mild abrasion and not become brittle or flake off. Neither could it change the physical properties of the surface of the pipe. Through research and experiments started in 1940 a thermo-setting plastic was found to be the answer.

The new pipe is in production at Spang-Chalfant division's plant at Ambridge, Pa. Drill pipe, the majority of it 4½-in. in diameter first is shot-blasted on the inside. Pipe is then upended in a rack and the liquid plastic is forced up the inside of the pipe until it reaches the top. It is then drained slowly so that no air bells or streaks are formed. After a short drying period at normal temperature, the pipe is placed in an oven and the plastic coating baked on. Four successive coatings are baked on the pipe.

Only the inside of the pipe is coated for oil-well drilling because it has been found that almost all corrosion fatigue failures develop only from the inside. Pipe turning in the hole keeps its outside surface burnished by rubbing against the wall of the hole. For most other applications the pipe probably would need to be coated on both the inside and outside surfaces.



Half-sections of 4½-in. OD drill pipe showing, left, inside surface of pipe as it comes from the mill; right, inside coated with a baked-on plastic. Plastic coating protects pipe against corrosion while drilling wells in highly corrosive oil fields

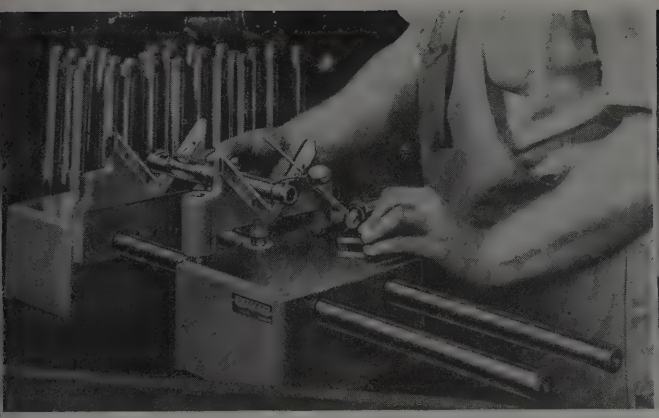


Fig. 1—Instrument is used by grinding machine operator to check concentricity during production

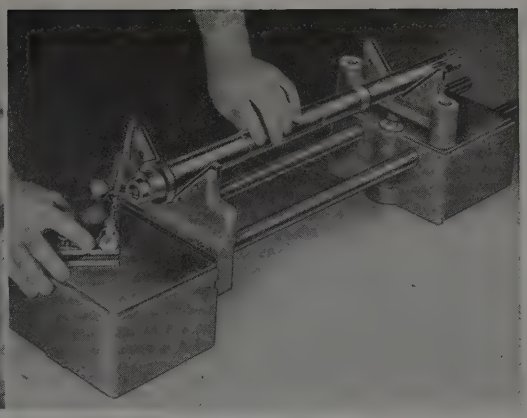
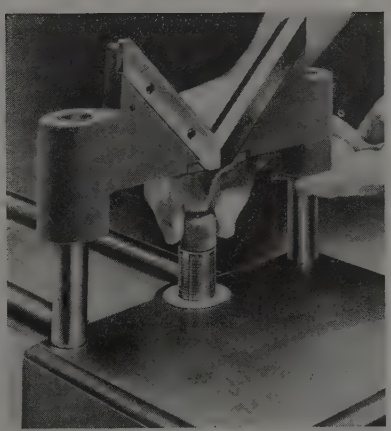


Fig. 2—Shaft of varying diameters is held in exact horizontal plane for checking concentricity of bores and outside diameters

Checking Concentricity OF ROUND PARTS

BY automatically determining the per center line heights for any com- ation of diameters involved in a work ce, the V-Liner shown in the accom- ying photographs is said to eliminate of complicated measuring equipment d mathematical computations in check- relative concentricities on round ts or sections.

Developed by Swanson Tool & Ma- ine Products Inc. of Erie, Pa., to sim- fy concentricity checking on a miscel- eous variety of close tolerance ma- ine parts, the instrument consists of V-blocks mounted on solid members d in correct alignment by cylindrical ls. The aligning rods are pressed into first V-block member and permit



the second member with elevating V-block to move as desired. By setting the adjusting screw to correspond to the diametrical difference between any diameter involved in piece to be checked, the device positions the part in horizontal plane for checking.

Concentricity of internal and external diameters and of shafts of varying bores and outside diameters can be determined. The fixture may be used in conjunction with machine tools to check parts in production as well as in finish machining and inspection.

Fig. 3—Establishing center line prior to introduction of work

ew Cutting Oil, Drawing ompound Introduced

A universal cutting oil for cutting all es of steel, said to give increased cool- efficiency, and a drawing compound t prevents metal to metal contact be- en dies and work piece, are offered by W. Kelley Co., Cleveland.

The cutting oil, named Kelcotene No. combines sulphur, chlorine and mineral to obtain the benefits of all three, the mpany states. It may be used on auto- tic screw machines, lathes, light aching, drilling, gear cutting and eading on low carbon steel and an- led alloy steels or, by cutting back th paraffin oil or kerosene, on harder els.

The drawing compound, Beacon No. 3, is nonpigmented and may be cut back to proper consistency with water. It can be applied with brush or by dipping. The company states that it also acts as a rust preventative.

Drive Mechanism Increases Stoker Life

By utilizing a new universal drive mechanism developed by Cone-Drive Division of Michigan Tool Co., Detroit, the Stoker Drive Co. of Frederick, Md., was able to reduce the basic cost of the drive as well as its number of parts. The drive makes it possible to increase stoker life, make the drive universally useable on different makes of stokers. The design lends itself to a line of stokers ranging in size from small household to large industrial models.

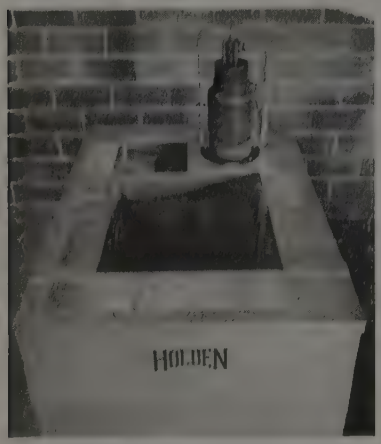
A major factor which had to be taken into consideration was the large gear reduction required in stoker drives between the motor shaft and the feed, i.e., 1750 to 2.2 rpm. Three drive sizes are being made to cover the 11 basic screw feed stoker sizes.

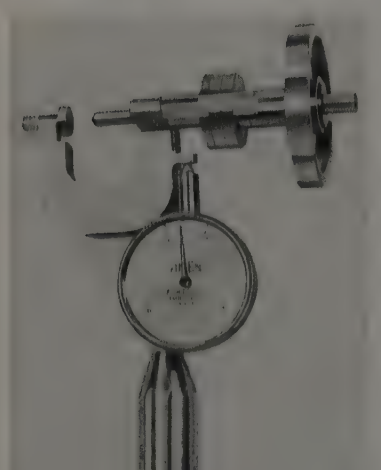
—o—

Stainless steels listed by trade names along with the proper Arcos alloy electrodes for welding each and a reference chart on alloy welding are being made available by Arcos Corp., Philadelphia. Steels are listed by AISI type number as well as by manufacturers' number.

The reference chart includes tables enabling user to determine which electrode should be used with what metal, weld metal chemical analysis, electrode identifications, heat treatments, and other related information.

Industrial Equipment





Steel Strapping Tool

Operation on a flat surface of 5 in., making possible use with narrow packages, is an advantage of the No. 3 Steelstrapper, illustrated above, available from Acme Steel Co., 2840 Archer avenue, Chicago 8. Weighing 6¾ lb, the tool has two levers, one for tensioning, the other for sealing and cutting the strap from the coil. Both levers travel in an arc. Sealer lever automatically returns to starting position after operation is completed. Seals are fed from a magazine holding 100 seals, into the sealer jaws for joining the two loose ends. Alignment is automatic. Tool will handle ¼, ⅜, ½ x 0.010 to 0.020-in. strap.

Steel 2/3/47; *Item No.* 9130

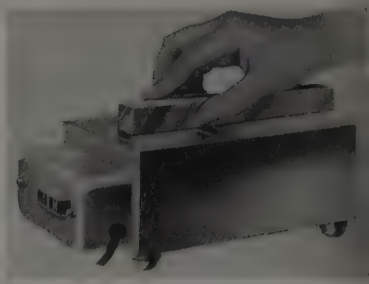
Portable Electric Hoist

Utilizing a double-reduction, totally enclosed, worm-gear drive, a new line of roller chain electric hoists, center left, made by Whiting Corp., Harvey, Ill., is so light that one man can install or move each unit without assistance. Because each hoist frame is a steel casting, the load is carried on steel from hook to hook. A self-energizing motor brake interlocks with controller to provide safe operation. Upper and lower safety limit switches also are provided. Roller chain operates on a large sprocket while load hook swivels on ball bearings. Each hoist is controlled by a bar grip which can be operated with one hand. Hoist can be mounted in an inverted position, if necessary.

Steel 2/3/47; *Item No.* 9116

Portable Hardness Tester

Hardness tests on rounds and flats up to 1 in. thickness may be run on the tester announced by Ames Precision Machine Works, Waltham 54, Mass. Readings are in rockwell scales with diamond and ball



penetrators. Brinell readings are easily transposed. Device, at left below, uses a screw action to force penetrators into the material. After it is checked with a test block, its hand wheel is turned until the dial indicator pointer is in the proper position. Actual readings are made on a lucite magnifier of scale numbers on the barrel dial of the tester. Ball penetrator is used for testing soft materials. Both V and round anvils are available. A cast iron base with clamp is also offered for bench use.

Steel 2/3/47; *Item No.* 9117

Demagnetizer

Large and small drills, punches, reamers, tools and dies, that have been in contact with a magnetic chuck or have become magnetized through processing, are demagnetized with unit, directly above, announced by Luma Electric Equipment Co., Toledo 1, O. One pass over flat top grid completely demagnetizes small pieces. For heavy, hard-to-handle pieces, it is only necessary to pass the portable instrument over and around the work. Segments on top of grid effectively spread magnetic field over entire surface, which has a mirror-finish to eliminate possibility of scratching. Units, housed in aluminum case, are offered in three sizes, 4½ x 7¾ in., 7¼ x 7½ in. and 7½ x 14 in.

Steel 2/3/47; *Item No.* 9133

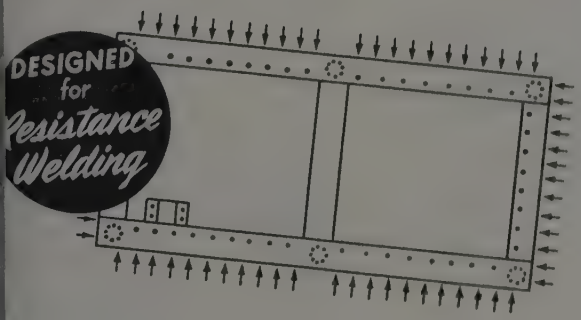
Quenching Furnace

Forced circulation with a motorized pump, producing a minimum of 30 and a maximum of 60 gph, minimum size furnace with effective work clearance and accelerated cooling means are features of the Marquenching furnace, upper left corner, introduced by A. F. Holden Co., New Haven 8, Conn. It may be heated by immersed electrodes, resistance calrod units or under-fired gas burners for hot quenching at temperatures of 300 to 500° F, martempering, austempering, hot quenching stainless steels, tempering operations to 700° F, bright temperi

(All claims are those of respective manufacturers; for additional information fill in and return the coupon on page 136.)

How spot-welding changed

A BOTTLE-NECK INTO A LINE-PACER



It takes 250 welds to make a Fruehauf door frame. 168 of these welds are made on 3 Progressive machines—16 seconds to a machine, welding time. One of the three is shown below.

Doors used to be the chief bottle-neck in the production of Fruehauf truck-trailers.

Recently Fruehauf design engineers and Progressive Welder process engineers got together. They re-designed the doors for automatic spot-welding. Three Progressive special Ultra-Speed universal welding machines were designed and installed. These not only take care of normal requirements but actually provide 100% reserve capacity for trailer door production.

RH, LH and side door frames (with 250 spot welds each) of several different sizes are assembled on the 3 machines at a rate of 60 complete assemblies per hour. Latch mounting plates and stiffeners are added, using 12 portable Progressive welding guns, with the door in a turntable fixture.

In addition to simpler manufacture and increased productivity per machine hour and man-hour, Fruehauf also saves floor space and has a better, stronger, door—that weighs 23% less. To the trailer operator that means increased payload.

This is another of the many case histories of "It Pays to Weld Progressive." We will be glad to assist you, too, in "designing for welding"—to lower your costs, increase production and improve your product.

For the latest news on Resistance Welding designs and methods, read the monthly Progressive WELDING PICTORIAL. Ask for it on your company letterhead.

IT PAYS TO WELD PROGRESSIVE

CABLE ADDRESS "PROGWELD"

Welder Co. 3050 E. OUTER DRIVE • DETROIT 12

RESISTANCE WELDING EQUIPMENT

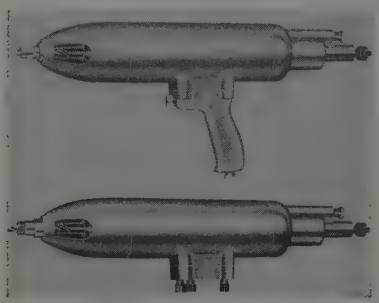
and age hardening of aluminum alloys.

Furnace embodies use of radiation by pumping of liquid from quenching area to outside area of pot, doubling radiation loss. Hot salts are pumped through the areation zone and then flow over a spillway, causing cooling of the liquid. A screen at spillway and a basket in quenching zone serve to remove sludge, metallic particles and lost parts. Practically any type of temperature control equipment can be used with the furnace, which is available in three sizes.

Steel 2/3/47; *Item No.* 9128

Pneumatic Drill Unit

Designed by Valley Tool Co., 5926 Maywood avenue, Huntington Park, Calif., for drilling, step-drilling reaming, counterboring, countersinking, spotfacing, threading and tapping, its pneumatic drills have adaptor bushings to support



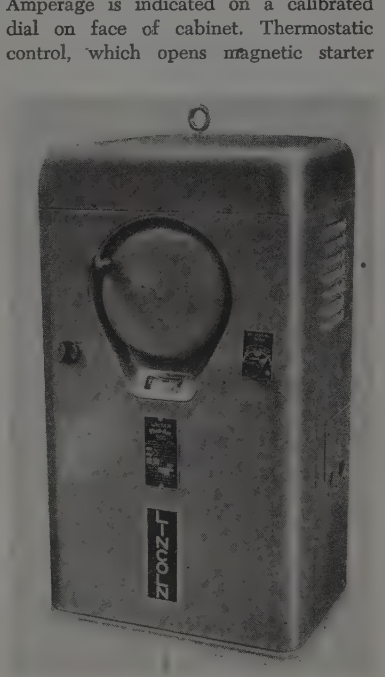
drilling units. Units are quickly transferred from one drill jig to another.

Drills consist of a standard pneumatic rotary drill motor mounted in a 2-way air cylinder. Powered entirely by air from a 90 to 100 lb line, they are equipped with a self-contained hydraulic variable feed control forward and a rapid reverse with an adjustable stop for accurate depths. These units are also for portable hand drilling in jigs having large quantities of holes the same size by adding a grip handle with air valve and using a hex-bayonet lock drill bushing in the nose of the drill unit. Unit will handle capacities up to 1 in. at speeds up to 5000 rpm.

Steel 2/3/47; *Item No.* 9092

AC Welder

Equipped with the Arc Booster which augments the current the instant the arc is struck, the Fleet Arc alternating current welder, illustrated here, made by Lincoln Electric Co., Cleveland 1, has exceptional depth of penetration, range of output, economy of operation and safety. Selector switch governs amount of booster current to be used to suit various requirements. Continuous and self-adjusting current control is provided by rotating reactor control which provides setting throughout range of welder. Amperage is indicated on a calibrated dial on face of cabinet. Thermostatic control, which opens magnetic starter



when overloaded, provides a high degree of self-protection for operator, permitting sustained welding at high current values with complete protection against overheating. Welder is manufacured in 200, 300 and 500 amp ranges.

Steel 2/3/47; *Item No.* 9058

Water Clarifier

To assure maximum effectiveness of clarification, with greatest economy of space and chemicals, Liquid Conditioning Corp., New York, has developed a Liquon sludge contact reactor, that combines operations of mixing raw water with coagulating chemicals. It properly agitates the mixture, maintaining a suspended deep sludge bed of previously accumulated precipitates, completely separating clarified water from the sludge, and concentrating impurity-saturated sludge for minimum volume of blowoff.

Precipitated impurities, which form a sludge with the coagulating or softening chemicals, are recirculated so all chemical in the tank is completely utilized. Settling is prevented by a large slow-moving agitator which operates over the entire bottom of the tank. Clarified water is separated from sludge by horizontal outward radial flow with gradually decreasing velocity. A sludge concentrator collects and considerably thickens some of the sludge for blowoff with automatic de sludging devices.

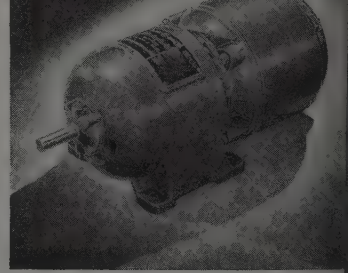
Reactor is well adapted for coagulatio of turbid, colored water, for softening c hard well waters by lime-soda, for simul taneously softening and clarifying har river waters, and for removal of iron, man ganese, silica or fluorides from water.

Steel 2/3/47; *Item No.* 9890

Hydraulic Coupling Drive

Link-Belt Co., 307 North Michiga avenue, Chicago 1, announces a new typ of packaged power unit, an Electrofluid drive that may be directly connected t a driven machine or speed reducer unit Available up to 20 hp, it is a compact motorized hydraulic combination consist ing of a general-purpose alternating cur rent induction motor flange-mounted o a housing containing a hydraulic couplin

The coupling is filled with a light mi



eral oil of steam-turbine quality. Wh motor drives impeller, it causes oil flow through runner buckets back to i peller, thereby rotating runner throu oil medium. Motor torque is transmitt from impeller to runner by fluid in t coupling. In effect, the fluid coupling serted between motor and load serves an automatic clutch, with fluid acting a cushion. Motor of Electrofluid dr starts at no-load. The motor accelera quickly, developing torque in the fl coupling in the ratio of the square speed, until sufficient torque up to ma mum running torque of motor is dev oped to start driven load.

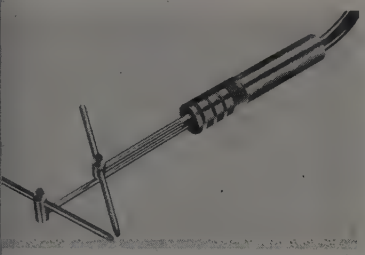
Steel 2/3/47; *Item No.* 9926

Welding Torch

Lite-Ning arc torch for use with b alternating and direct-current welder announced by Cesco Products Inc., North LaSalle street, Chicago 2. I designed to give a soft intense heat w no pressure blow or oxides from its bon arc flame. It can be used in w ing aluminum and virtually all fer

(All claims are those of respective manufacturers; for additional information fill in and return the coupon on page 136.)

d nonferrous metals as well as brazing, dering, preheating and hard surfacing. Torch features a time-saving automatic that simplifies welding procedure. A mb control permits the operator to

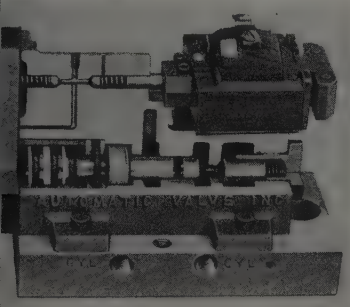


intain instant adjustment of the arc all times. Two models are offered, e for ¼-in. carbons and one for ⅜-in. bons.

eel 2/3/47; *Item No.* 9982

olenoid Air Valve

High speed air cylinder actuating ma-ine tool operations are controlled by a del SV-4 four-way, four-port solenoid erated air valve produced by Automatic lve Inc., 37415 Grand River avenue, rmington, Mich. Small, compact and



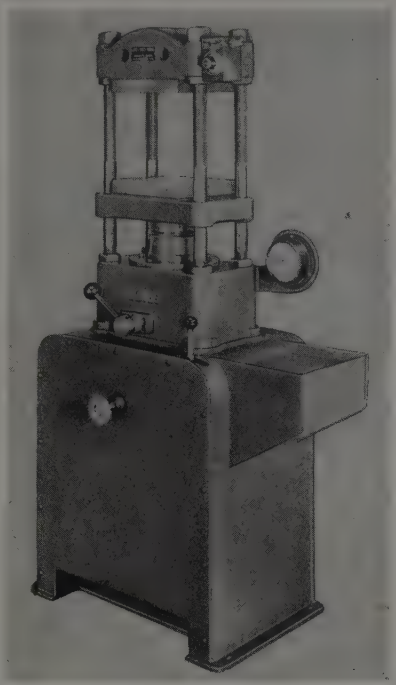
ht in weight, it can be mounted close cylinders, eliminating excessive piping d waste of air. Valves also are made in e port types for differential air pressures 0-150 lb.

Valves are of the pressure sealed pop-t, shuttle type and are stemless with rt solenoid plunger travel of ⅛-in. They e made in ¼, ⅜, ½ and ¾-in. sizes. erating power values are low, being 42 amp in-rush at 110 v, 60 cycles, 0.22 p sealed. All are of noncorrosive alumi-m.

eel 2/3/47; *Item No.* 9994

ydraulic Press

New line of high-production, fully wer-operated, hydraulic presses that ve neither motor nor pump are an-unced by Elmes Engineering Works American Steel Foundries, 1002 Ful-ton street, Chicago 7. Compressed air from shop line, introduced above the liquid by a simplified control, provides power for rapid closure and instantaneous full pressure, applies and maintains any desired pressure within capacity range and repeats at that pressure until



reset. Presses are made in 20 and 30-ton bench and floor-type models, and in 50-ton floor-type. Thirty-ton floor-type, shown, has 6 in. stroke and an opening adjustable from 0 to 13 in. It can be equipped with 10 x 10 in. hot plates.

Steel 2/3/47; *Item No.* 9915

Industrial Valves

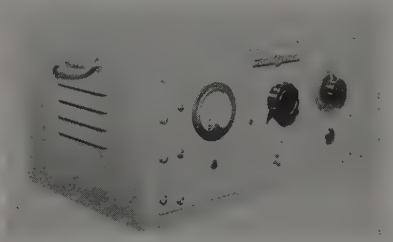
Production of a series of industrial valves incorporating a number of new features is announced by Parker Appliance Co., 17325 Euclid avenue, Cleveland. Available in needle and globe types in sizes up to 1 in. and in both angle and offset designs, the valves are unusually small and compact.

Both types are available in six variations of connection arrangements. Straight-line types are produced with female pipe threads, or with tubing threads for use of flexible tubing. Angle types are provided with female pipe threads, with tube threads, or with male pipe threads at inlet connection and either tube or female pipe threads at side outlet. Tubing is accommodated in a range of from ¼ to 1 in. OD, pipe from ⅛ to 1 in. All valves are provided with integral mounting lugs for convenience in securing valves to brackets or panels to insure leak-proof connections in installations where vibration is a factor.

Steel 2/3/47; *Item No.* 9916

Flaw Detector

Flaw detector that continuously detects and counts holes, weak spots, and conducting paths in thin materials such as sheet rubber and mica, plastic materials

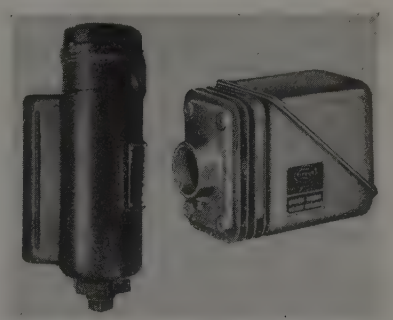


and enamel films on wire is announced by General Electric Co., Schenectady, N. Y. Device, illustrated here, is applied to sheet materials up to 0.025-in. thick moving as fast as 450 ipm, and to wire moving up to 100 ipm. It consists of an electrode assembly through which an adjustable voltage is applied to material undergoing test. An electronic circuit indicates flow of current through the material which occurs when a flaw passes under the electrode. Detector can be made to sound an alarm, operate a recorder or shut down processes.

Steel 2/3/47; *Item No.* 9115

Combustion Control

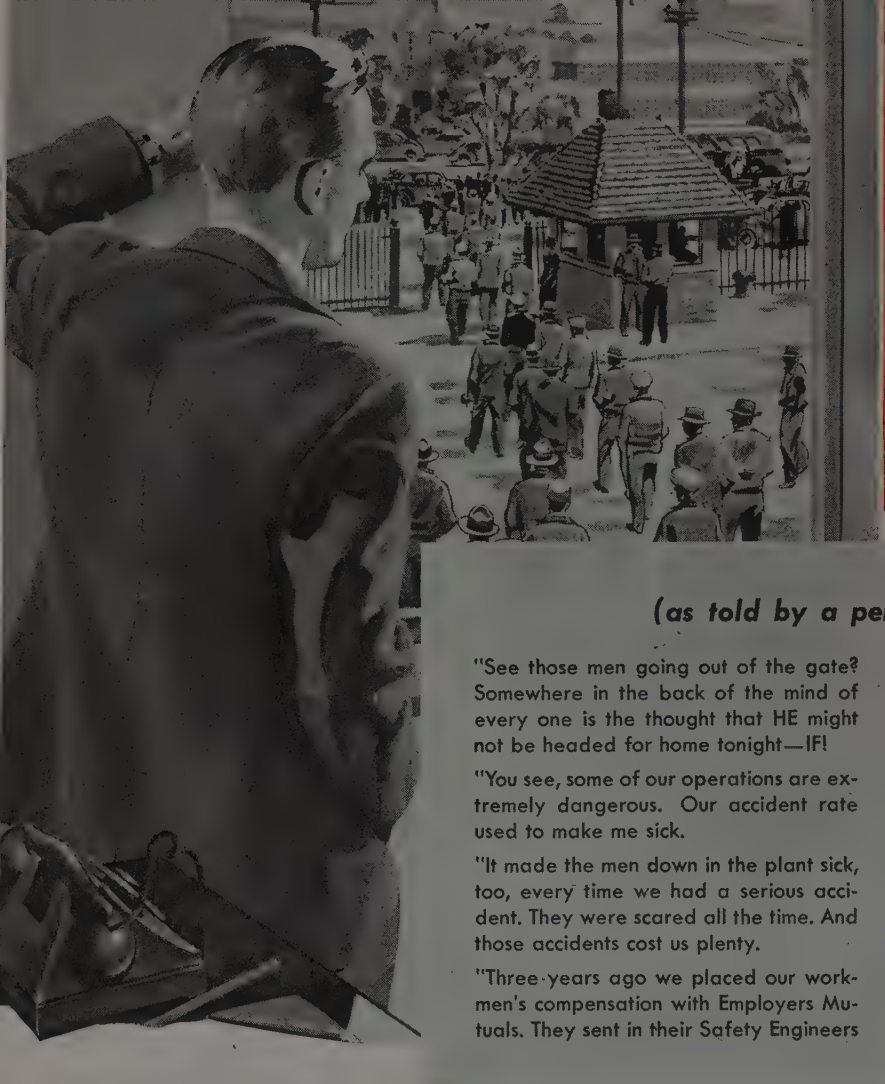
Fireye combustion control, type F18TS, manufactured by Combustion Control Corp., 77 Broadway, Cambridge 42, Mass., combines in a single unit safeguards against flame failure and low



boiler water level in commercial and industrial oil burning equipment. An electric eye that actually sees flame, the device cuts off fuel or sounds an alarm when flame fails.

Unit consists of a phototube and amplifying system housed in a dust-tight alumi-

(All claims are those of respective manufacturers; for additional information fill in and return the coupon on page 136.)



Why

HOM

(as told by a personnel director)

"See those men going out of the gate? Somewhere in the back of the mind of every one is the thought that HE might not be headed for home tonight—IF!

"You see, some of our operations are extremely dangerous. Our accident rate used to make me sick.

"It made the men down in the plant sick, too, every time we had a serious accident. They were scared all the time. And those accidents cost us plenty.

"Three years ago we placed our workmen's compensation with Employers Mutuals. They sent in their Safety Engineers —and those fellows do know their st We thought we knew something ab safety—but those engineers were ahead of us.

"Today we've got a real Safety P gram. Accidents just quit happening seemed almost like a miracle!

"If it hadn't been for that Safety P gram, one hundred and sixty-three those men going home to supper would have been killed this year, or up in the hospital, or maybe crippled life. Right here in this plant!

"They're pretty good guys, too."

For the benefit of policyholders . . .

Employers Mutuals have a long experience as one of the largest carriers of workmen's compensation (they wrote one of the first policies ever issued). Their constant effort to provide for the welfare of policyholders has given them unusual insight into the needs of employers and of their employees.

To serve those needs, they have developed Safety Engineering and other services, in order to reduce the number of accidents to employees, and to provide care for injured employees.

You can reduce your insurance costs

All these services are available to you, to reduce your accident frequency and accident severity, thereby reducin the cost of your insurance.

In addition, all savings made throug sound, conservative managemen over and above provision for amp reserves and surplus, are returned policyholders in the form of dividen —a further reduction of your insu ance costs.

Employers Mutuals write:

Public Liability . . . Automobile . . . Plate Glass . . . Burglary . . . Workmen's Compensation . . . Fidelity Bonds . . . Group Health, Accident, Hospitalization . . . and other casualty insurance . . . Fire . . . Tornado . . . Extended Coverage . . . Inland Marine . . . and allied lines of insurance. All policies are nonassessable. Branch offices in principal cities. Consult your telephone directory.

EMPLOYERS MUTUALS of WAUSAU

163 men WILL BE FOR SUPPER TONIGHT

his leader in Safety Engineering can reduce YOUR ccident rates . . . and save you money, too

nployers Mutuals nationally known hievements in Safety Engineering sult from the basic principle guiding ese progressive companies—to op- ate for the benefit of the policy- lders and their employees.

M Safety Engineers were first put work because high accident rates ade workmen's compensation insur- ce costs a burden to employers. id insurance costs are only the ginning of the price you pay for cidents.

her costs include lost production, oiled material and broken machin- y, replacement of trained workers, wered efficiency of others who see accident—talk about it—are fear- l of their own safety.

Get safety-on-the-job

M Safety Engineers have developed efficiently planned and coordinated ogram that can build safety-on-the- o for you—from the ground up. gineers survey your plant to analyze e hazards surrounding your em- oyees. Engineering specialists on various machines and industries, chemists, industrial nurses all play their part in such a survey. They make recommendations for eliminating these hazards.

Engineers help you set up a safety program. They provide practical suggestions, posters, literature, films, and other help. Safety education helps your men understand the fundamental principle of safety-on-the-job—that taking time to be safe saves time —and lives.

The Industrial Hygiene department and a staff of industrial nurses help eliminate the causes of occupational diseases. The Employers Mutual nurse will help you set up an efficient first aid department.

E-M Safety Engineering has reduced accident rates as much as 60% to 75%. Even in exceptionally hazardous industries, accidents can be brought under control.

Another service to policyholders and their employees is the effective use of modern physiotherapy laboratories when serious accidents *do* occur. Physiotherapy frequently reduces the time lost following a severe injury, and over and over again has prevented permanent disability.

Ask an Employers Mutuals man for an engineering survey of your plant and recommendations for the safety program you need to reduce your accident rates.

FREE: Write for complete information on Safety Engineering, and for a copy of "A Dictionary of Insurance Terms—How to Understand Insurance and Buy It Intelligently." Write on your business letterhead to: Insurance Information Bureau, Employers Mutuals of Wausau, Wausau, Wisconsin.

GET THIS E-M RISK ANALYSIS ON YOUR PUBLIC LIABILITY HAZARDS

Employers Mutuals engineers can show you, through a Survey and Risk Analysis, how to eliminate most of the hazards that might result in injury to members of the public on your premises or through the operations of your business.

Employers Mutuals combine in one comprehensive policy the several forms of public liability protection needed by manufacturing, mercantile, and contracting firms—protection against claims arising from all the usual and all the unusual chances of loss through bodily injury and damage to property of others.

Only after a survey of the hazards can the proper form of this comprehensive policy be recommended. Then, Employers Mutuals tailor the policy to provide the coverage needed.

Ask the Employers Mutuals man to make a Survey and Risk Analysis of your public liability requirements. This analysis involves no obligation.

make Insurance Understandable

EMPLOYERS MUTUAL LIABILITY INSURANCE COMPANY OF WISCONSIN
ESTABLISHED 1911
EMPLOYERS MUTUAL FIRE INSURANCE COMPANY
ESTABLISHED 1934
Home Office: WAUSAU, WISCONSIN

num case. Entire control is mounted directly on the furnace wall and is aligned to permit the photoelectric cell to observe the flame through a 2 in. pipe connection. It protects against low boiler water level by means of a single probe which is mounted parallel to the boiler water column and wired to Fireye control. The bottom of the probe defines the danger point below which boiler water must not fall.

Steel 2/3/47; *Item No.* 9999

Cartridge Filters

Ten sizes in three new models of expendable cartridge filters are in production at Bowser Inc., Fort Wayne, Ind. Filters contain replaceable, resin-impregnated, cellulose elements which remove particles as small as 1 micron (0.000039-in.) from liquids. Cartridges are completely neutral, contain no chemical bleach and will not remove additives or inhibitors, or affect color of filtered liquids except by reduction or removal of foreign matter.

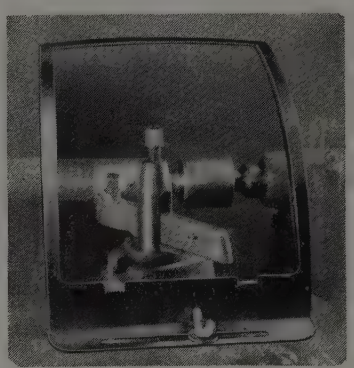
Capacities range from 2/5 to 300 gph with filtering areas from 0.2 to 100 sq ft. All units are equipped with vent and drain valves and bolted covers for cleaning and replacing. Overall dimensions range from 19 to 56 in. in height, and 12½ to 30½ in. in diameter, with pipe connections from 2 to 4 in.

Steel 2/3/47; *Item No.* 9997

Lathe Guard

Lathe and wheel guard which permits complete and continuous work inspection with safety is announced by Standard Safety Equipment Co., 232 West Ontario street, Chicago. Called the Stasafe chip guard, it protects operators from flying particles and oil, without obstructing work or vision at point of operation. The guard is adaptable to lathes, shapers, grinding wheels, tool grinders and other machines.

Guard is constructed with a strong, all-metal frame, and equipped with a



replaceable tough plastic window, curved to permit overall work inspection. A universal attachment on its base permits setting at any angle desired.

Steel 2/3/47; *Item No.* 9986

Screw Finder

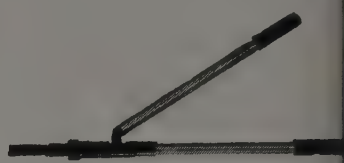
Jackson collet-type screw finder for electric and pneumatic screw drivers starts and completely sets screws in a single operation. The finder, offered by James Industries Inc., Skaneateles, N. Y., is attached to the screw driver. It holds the screw firmly, working in any position, and in places not easily accessible. One hand is left free for positioning work.

Finder is nonrotating and close-fitting to prevent the bit from whipping. Bit is guarded and no impression is left on the screw head or on the work surrounding the screw. Models are available for use with all standard types and sizes of machine as well as with wood screws.

Steel 2/3/47; *Item No.* 9923

Rivet Hand Gun

Designed especially for small-quanti users of the larger sizes (7/32, 1/4 a 9/32-in.) of Cherry blind rivets, the ne G-55 hand gun will, when used wi an adapter, also install smaller rive The hand gun, made by Cherry Riv



Co., 231 Winston street, Los Angeles I is especially useful for field work whe air pressure is not available.

Gun operates on ratchet principle, a is lightweight and easy to handle. It 29 in. long, including the pulling hea and weighs 4½-lb complete.

Steel 2/3/47; *Item No.* 9978

Sand Density Indicator

A molding sand density indicat which shows weight in pounds per cub foot of any molding material under degree of ramming compactness, under an American Foundry Associati standard sand specimen degree of ra ming, has been developed by the Ha W. Dietert Co., Detroit. It may be tached to any sand rammer by means two screws and does not interfere w the other functions of rammer or flow bility test.

A known weight of molding material placed in a 2 in. diameter specimen tu and rammed, for example, with th

FOR MORE INFORMATION on the new products and equipment mentioned in this section, fill in this form and return to us. **It will receive prompt attention.**

Circle numbers below corresponding to those of items in which you are interested:

9130	9926	9923
9116	9982	9978
9117	9994	9990
9133	9915	9996
9128	9916	9038
9092	9115	9020
9058	9999	9111
9890	9997	9974
	9986	
	2-3-47	

NAME ..... TITLE.....

COMPANY .....

PRODUCTS MADE .....

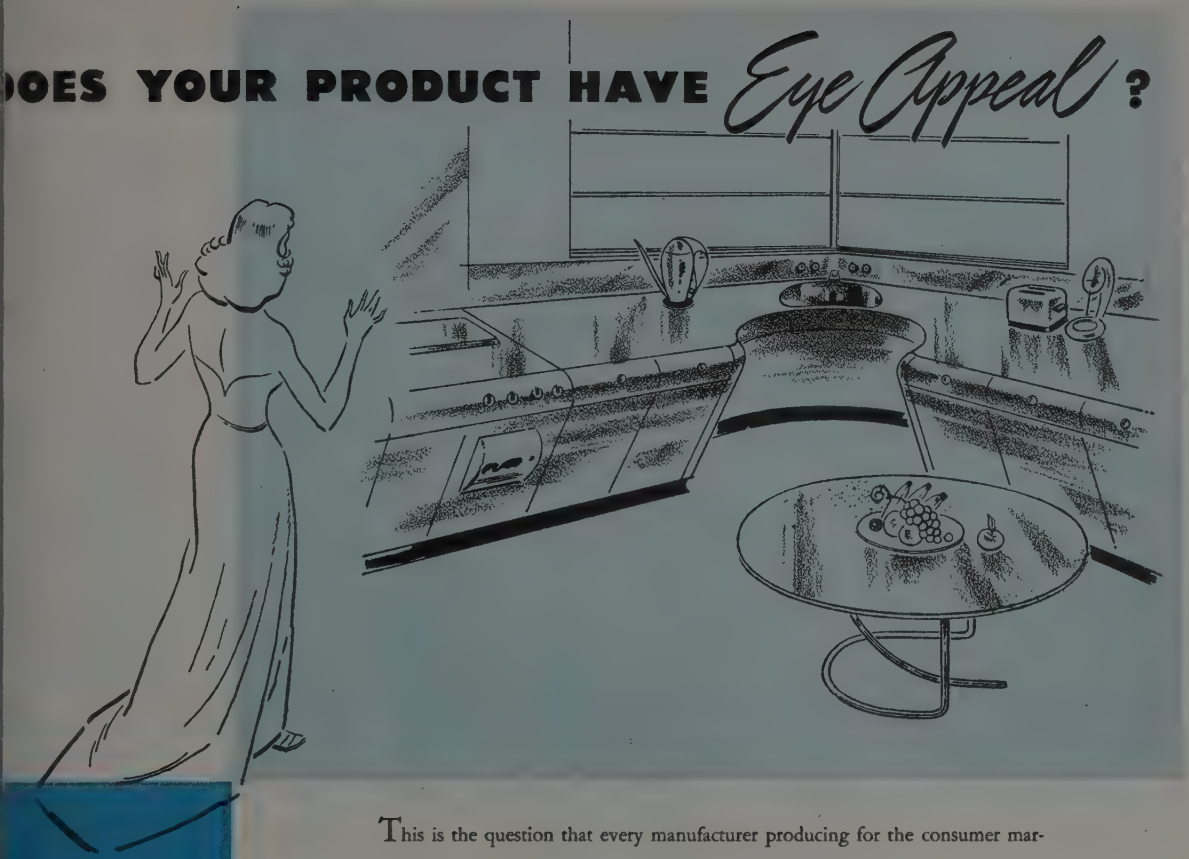
STREET .....

CITY and ZONE ..... STATE.....

Mail to: STEEL, Engineering Dept.—1213 West Third St., Cleveland 13, Ohio

(All claims are those of respective manufacturers; for additional information fill in and return the coupon on this page.)

...OES YOUR PRODUCT HAVE *Eye Appeal*?



This is the question that every manufacturer producing for the consumer market asks himself. The eye appeal of your product is the silent salesman—the factor that, in many cases, makes the decision for the buyer. The critical buying public demands quality of product, simplicity of operation, easy upkeep, and outstanding appearance when they choose something with which they have to live or work.

To the manufacturer—**MicroRold** Stainless Steel should be considered; *it has eye appeal.* It is readily adaptable to a host of applications in the domestic and architectural fields. It has exceptional physical properties, high strength, ease with which it can be fabricated and improved corrosion resistance insuring lasting beauty and continuing eye appeal.

The Washington Steel Corporation's mill is devoted entirely to the production of **MicroRold** stainless alloys in both sheet and strip form. Produced by a unique, new process, **MicroRold** is supplied remarkably uniform to gauge throughout its entire cross section and length ranging from .004 to .078 inches in commercial tempers and finishes. **MicroRold** is presently supplied in Types 301, 302, 304 and 430 up to 36 inches wide.

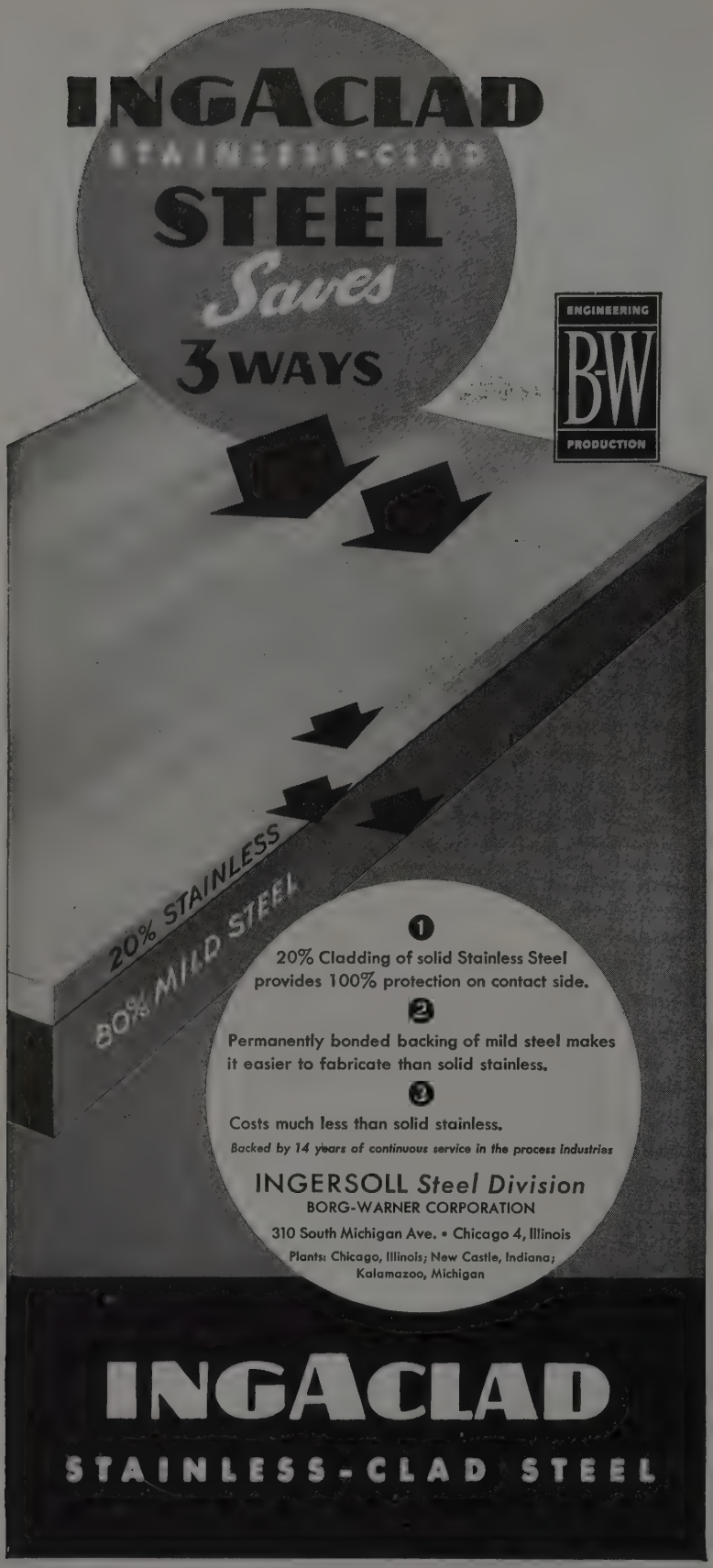
HARTFORD
36 Pearl Street
Hartford 7-7021

DETROIT
2563 Guardian Bldg.
Randolph 2105

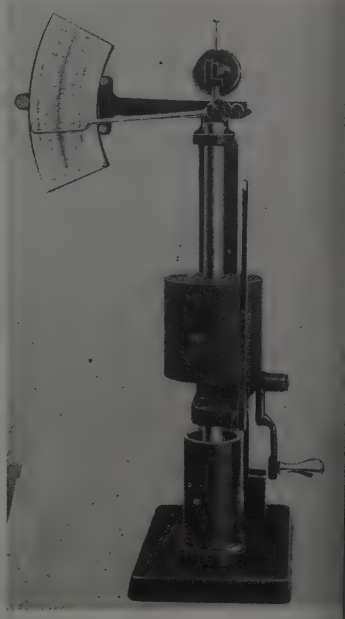
CHICAGO
One North LaSalle Bldg.
Franklin 2733

WASHINGTON STEEL CORPORATION
MicroRold
STAINLESS & STEEL

WASHINGTON
STEEL CORPORATION
WASHINGTON, PENNSYLVANIA



drops of the sand rammer weight. D
sity indicator pointer will show
weight in pounds per cubic foot for t



material when rammed to that spec
hardness.

Steel 2/3/47; *Item No.* 9990

Thermostat

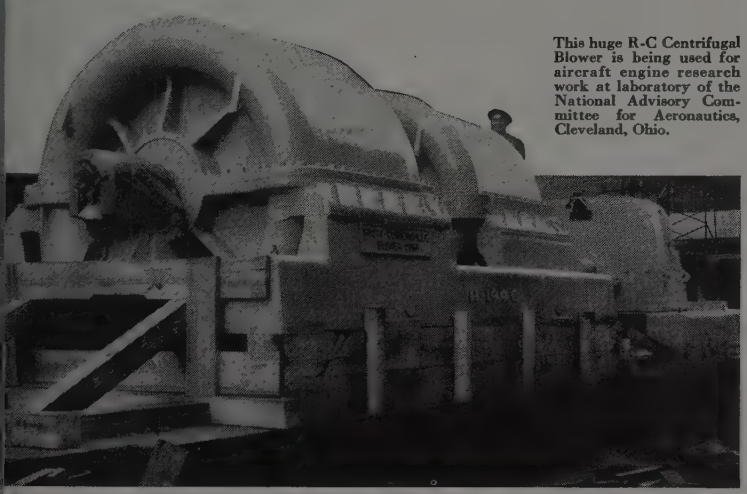
United Electric Controls Co., 71
street, South Boston, Mass. announce
type MI immersion thermostat desig
for close temperature control on q
battery chargers. It is also applicable
controlling temperature of strong liqu
gases and hot plates. Thermostat is s
plied with a neoprene sleeve which g
complete protection to unit for appl
tions injurious to brass. It has an electr
rating of 1000 w, 110 v ac, noninduc
The on-off differential is 3° F, and
control is adustable within the rang
0° to 250° F.

Steel 2/3/47; *Item No.* 9996

Observation Platform

An electrically operated platform
designed for safety and conveni
of those who work at various hei
above floor levels is announced by
well-Parker Electric Co., 4205 St.
avenue, Cleveland 14. Unit (illustr
here) has two platforms, one statio
at a height of 5 ft and the other ada
to be raised or lowered within a rang
8 ft above the floor, thereby provi
tor observation at 13 ft and adjustm
at 15 ft, including body height.
chiefly of aluminum alloy and mou
on ball bearing, rubber-tired wheel

Freight car loaded with WIND



This huge R-C Centrifugal Blower is being used for aircraft engine research work at laboratory of the National Advisory Committee for Aeronautics, Cleveland, Ohio.

This freight car packs hurricanes! It's loaded with a Roots-Connersville Centrifugal Blower that in just one minute can push the air out of a 10′ circular tunnel, 450 feet long. Or, it can blow a gentle breeze, too, if that's what is wanted.

Not all industrial blowers are that big. But whether they're big or little, Roots-Connersville builds them down to the small Rotary Positive units delivering only ten cubic feet per minute. With both Rotary and Centrifugal equipment to choose from, our engineers can recommend the size and type that will precisely match your requirements. That's R-C *dual-ability*.

For any problem involving the profitable movement of air or gas, call on R-C *dual-ability*, based upon almost a century of specialized experience.

ROOTS-CONNERSVILLE BLOWER CORPORATION
702 Steelton Avenue, Connersville, Indiana

ROOTS-CONNERSVILLE BLOWER BUILDERS R-C SINCE 1854
ROTARY CENTRIFUGAL
BLOWERS • EXHAUSTERS • BOOSTERS • LIQUID AND VACUUM PUMPS • METERS • INERT GAS GENERATORS
★ ★ ONE OF THE DRESSER INDUSTRIES ★ ★

LET US PROVE THE VALUE OF *R-C dual-ability*

Your questions on the more profitable handling of air or gas will be welcomed by Roots-Connersville engineers. Check the following list for suggestions and we'll gladly supply information on your requirements.

- Pneumatic conveying systems
- Tunnel ventilation
- Acid-making processes
- Liquid aeration and agitation
- Grain conditioning or bleaching
- Departmental gas metering
- Heat-treating and annealing
- Vacuum filtration processes
- Boosting gas system pressure
- Priming centrifugal pumps
- Transporting live fish
- Supplying safety helmet air
- Mining and smelting
- Unloading tank cars and trucks
- Supercharging or scavenging Diesels
- Paper mill vacuum processes
- Drying textile yarns
- Reducing explosion hazards

MAIL THIS COUPON WITH YOUR LETTERHEAD

Roots-Connersville Blower Corporation
702 Steelton Avenue,
Connersville, Indiana
Please send information on:

BLOWERS_____ EXHAUSTERS_____
VACUUM PUMPS_____ METERS_____
BOOSTERS_____ INERT GAS GENERATORS_____
LIQUID PUMPS_____

NAME_____
TITLE_____

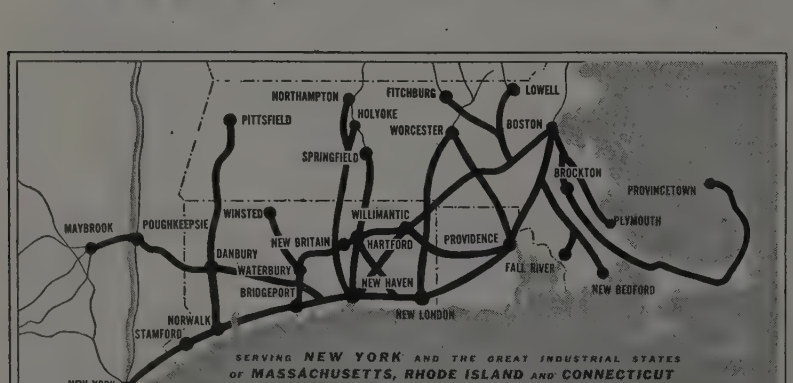
Need Ready *Electric Power?*

Billions of Kilowatt Hours are produced annually in Southern New England.

The high concentration of industry in Southern New England has resulted in a network of power facilities second to none in America. In this compact area, transmission lines are short and industry is assured of an adequate and dependable power supply at reasonable rates through numerous inter-connected feeder lines.

A well-integrated power supply is just one of the many industrial advantages to be found in Southern New England. For more facts on all the benefits available for your new plant location, write for the new booklet, "SOUTHERN NEW ENGLAND FOR TOMORROW'S INDUSTRY." Address: P. E. Benjamin, Mgr., Industrial Development, New Haven R. R., Room 201N, 80 Federal Street, Boston 10, Mass.

THE **NEW HAVEN** R. R.



one-man moving, it has a base of 8
6 ft with electric motor, reduction g
and winding drum for hoist cables
closed in base. Capacity of truck

500 lb. Operating current is derived fr
building circuit through a flexible cab
Steel 2/3/47; *Item No.* 9038

Fire Extinguisher

With contents weighing 3⅝-lb, but
panding upon release to 450 times th
contained volume, the Speedex carb
dioxide fire extinguisher, developed
American-LaFrance-Foamite Corp.,

mira, N. Y., is 3 9/16-in. in diameter a
22 in. long. It is operated by a sque
type valve which releases the extingui
noncorrosive, nonpoisonous and odorl
ing agent by palm pressure. The g
is a nonconductor, will not freeze a
will not support combustion. It can
used for extinguishing small fires in
and greases and in small electrical haza
Steel 2/3/47; *Item No.* 9020

Horizontal Unit

Horizontal unit illustrated here beco
a permanent, integral part of any mc
Bridgeport vertical turret milling
chine. With this device, built by Mal
Machine & Tool Co. Inc., 19301 St. C
avenue, Cleveland 10, errors due to
setting from vertical to horizontal
eliminated. After job is set up, work

STEEL IMPROVEMENT

FORGED TURBINE BLADES ARE ALWAYS Dependable

Turbine Blade

Auxiliary Engine Turbine Blade

Shrouded Gas Turbine Blade

Axial Flow Compressor Blade

It was clear to Steel Improvement Engineers, at the initial stage in the application of jet propulsion to aircraft, that the forging of turbine blades, buckets and wheels would require something beyond traditional forging techniques. There followed the immediate adoption of an attitude in which the urge to pioneer, to persist in the effort to discover and establish correct techniques for forging high temperature alloys to close tolerances, was given the utmost freedom of action. Responding to the irrepressible urge to forge correctly these essential parts, funds were generously appropriated at the beginning to obtain or develop suitable equipment and to conduct experimental forging. Success crowned this effort. Thousands of these vital parts have been formed of the new high temperature alloys by drop forging to close tolerances. On the basis of long experience in forging intricate designs, and of the specialized metallurgical and engineering skill acquired, it is now possible for Steel Improvement Forging Engineers and Metallurgists to: (1) know the exact forging technique that should be utilized for developing fully the qualities, inherent in the alloy, that are required to meet the high stresses occurring in modern aircraft engines; (2) avoid costly experimentation in forging, heat treating and machining blades, buckets and wheels; (3) advise and assist designers regarding the correct placement of parting lines and other design elements; and (4) adhere strictly to a policy of projecting a promise only when the accomplishment of the work can be substantiated by fact or experience or both.

THE VITAL ELEMENT IN THE IMPROVEMENT OF METALS BY FORGING IS MEN!

Backed by over 33 years of forging production experience, Steel Improvement Engineers and Metallurgists have under their direction complete facilities for performing the highly specialized work of forging, heat treating and machining turbine blades, buckets and wheels of high temperature alloys. These facilities constitute a Turbine Forgings Division, the authority and responsibility of which encompasses all required phases of engineering, metallurgy, production and inspection to assure you dependable forgings.

Turbine Forgings Division

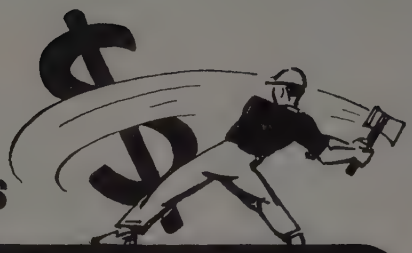
DROP FORGINGS

THE STEEL IMPROVEMENT & FORGE CO.

942 East 64th Street CLEVELAND, OHIO

Sales Offices: New York • Chicago • Milwaukee • Tulsa • Los Angeles

Watch this Electric Hoist cut handling costs



CM METEOR

SEE the speedy Meteor in action and you'll agree that materials handling costs are down for the full count. This heavy duty electric hoist is an outstanding performer... a time and money saver. Helical gears, airplane type cooling, low headroom, thermal protection, only 110 volts at push button station...and speed...are but a few of the Meteor's notable features. Bulletin 142 will tell you about all of them. Better still, the Meteor itself will bring you all of them.

Capacities from ½ ton and up. Lifting speeds from 18 to 60 feet per minute.

CHISHOLM-MOORE
HOIST CORPORATION
(Affiliated with Columbus-McKinnon Chain Corporation)
GENERAL OFFICES AND FACTORIES: TONAWANDA, N. Y.
SALES OFFICES: New York • Chicago • Cleveland • San Francisco • Los Angeles

done vertically with milling machine, the horizontally on the attachment.

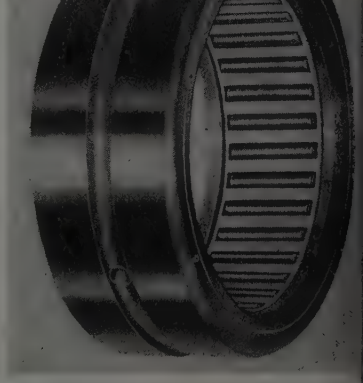
Unit is furnished with horizontal hou ing, heat treated and ground spindl roller bearings, floating motor mountin reversing switch, a 6-step pulley an

V-belt. Furnished spindle is a No. Brown & Sharpe taper. Spindle is capab of end milling, by cutting, boring an drilling, at varied speeds of 125 to 30 rpm.

Steel 2/3/47; *Item No.* 9111

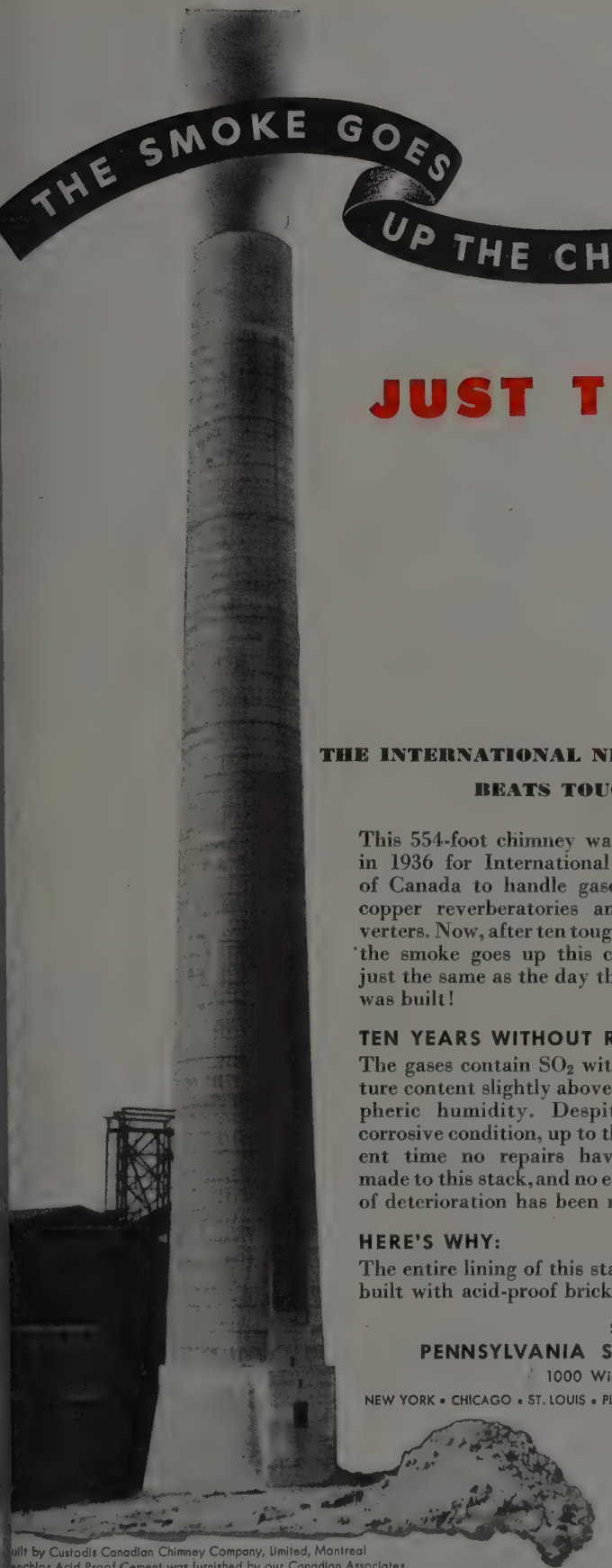
Cage Type Needle Bearing

Adapted for spindles and high spee applications, a new cage type needle bea ing assures permanent alignment rollers in either vertical or overhung pos tions. Made by Orange Roller Bearin Co. Inc., 557 Main street, Orange, N. its rollers run in a cage, fabricated



antifriction, nonferrous metal. Ca pockets are coined to the contour of t rollers and cage land revolves on t outer race, preventing cage pockets fro wearing on the rollers. Bearings are man factured in a wide range of shaft sizes.

Steel 2/3/47; *Item No.* 9974



JUST THE SAME!

THE INTERNATIONAL NICKEL COMPANY OF CANADA, LIMITED
BEATS TOUGH CORROSION CONDITION

This 554-foot chimney was built* in 1936 for International Nickel of Canada to handle gases from copper reverberatories and converters. Now, after ten tough years, the smoke goes up this chimney just the same as the day the stack was built!

TEN YEARS WITHOUT REPAIR

The gases contain SO_2 with moisture content slightly above atmospheric humidity. Despite this corrosive condition, up to the present time no repairs have been made to this stack, and no evidence of deterioration has been noticed.

HERE'S WHY:

The entire lining of this stack was built with acid-proof brick laid in Penchlor Acid-Proof Cement.** In addition the top fifty feet of this stack was further protected by using Penchlor Acid-Proof Cement for pointing the outside surface joints. Penchlor Acid-Proof Cement is a superior sodium silicate cement that is quick-setting and self-hardening. Its outstanding record of satisfactory service has been proved in chemical plants, steel mills, paper and pulp mills, oil refineries and smelting plants.

SEND FOR CASE REPORT

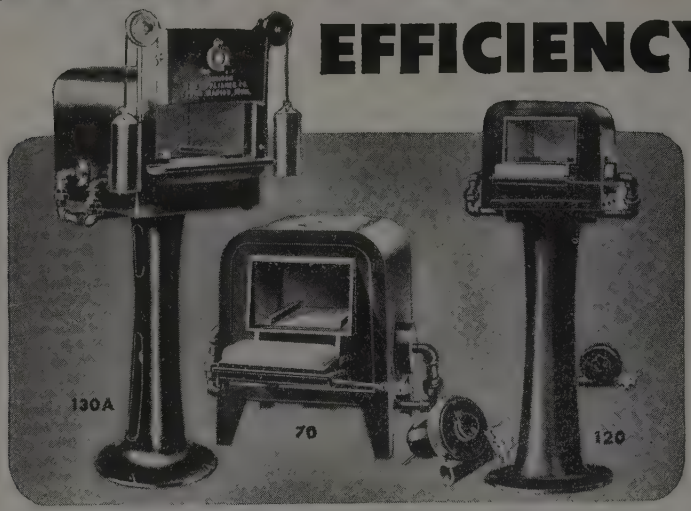
If you have a corrosion problem, you'll be interested in further details about this Penchlor installation, as well as an illustrated brochure on Penchlor. Write for Case Report Number 62-2.

Special Chemicals Division
PENNSYLVANIA SALT MANUFACTURING COMPANY
1000 Widener Building, Philadelphia 7, Pa.
NEW YORK • CHICAGO • ST. LOUIS • PITTSBURGH • CINCINNATI • WYANDOTTE • TACOMA • PORTLAND, ORE.

PENN SALT
CHEMICALS
97 Years' Service to Industry

uilt by Custodis Canadian Chimney Company, Limited, Montreal
enchlor Acid-Proof Cement was furnished by our Canadian Associates
. F. Sterne & Sons, Ltd., Brantford, Ontario

HIGH SPEED EFFICIENCY



THAT CUTS PRODUCTION COSTS

Quick Acting JOHNSON FURNACES

Reduce toolroom bottlenecks and eliminate unnecessary lost time waiting for tools and dies. Heat treat high speed steels, harden high carbon steels, braze carbide tipped tools in your own plant. There's no waiting for *Quick Acting* JOHNSON Hi-Speed Heat Treating Furnaces. They are ready for action to produce high uniform temperatures quickly and at remarkably low fuel cost. Wide temperature range can easily be regulated with accuracy to handle ANY steels or for hardening small metal parts. Install *Quick Acting* JOHNSON Furnaces on your firing line and turn the heat on production. There's a size for every toolroom and shop. Write for descriptive literature.

No. 130A Hi-Speed
For steels requiring 1400 to 2300°F.
Firebox 7¾ x 13 x 16½.
Four burners.
$325.00

No. 70 Hi-Speed Bench Furnace
2250°F. in 30 Minutes
Treats all steels.
Firebox 5 x 7¾ x 9.
Two burners.
$105.50

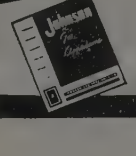
No. 120 Hi-Speed
1500°F. in 5 Minutes.
2300°F. in 30 Minutes
Firebox 5 x 7¾ x 13½.
Two burners.
$145.50

ALL PRICES F. O. B. FACTORY

Furnaces described are complete with Carbofrax Hearth, GE Motor and Johnson Blower

JOHNSON GAS APPLIANCE CO.

573 E AVENUE N. W. CEDAR RAPIDS, IOWA



Complete JOHNSON Catalog
Write for Free Catalog describing all time saving, cost cutting JOHNSON Furnaces for pot hardening, melting, annealing, and heat-treating purposes.

Automatic Welding

(*Continued from Page* 97)

circuit for that gun. The disk passes at high speed to uncover port No. and the same cycle is repeated for gu No. 2, etc.

Reasons for the use of multiple cam and breakers are to permit a wide ran of adjustments. Thus the four-speed co trol cams control four air valves. The enable a wide speed variation of th air motor according to the length dwell desired. The four heat-contr cams permit a broad selection, from 0 100 per cent of heat, by means of tran former taps—or phase-shift heat contr if desired. The breakers have 180-degr cams and rotate a total of 360 degre for each position of the disk. Use of tw breakers, connected in series, permi full range of stepless adjustment for we time. Cams are made up in segmen permitting easy change to alter weldi conditions for any one gun.

Current to all the guns is supplied a single water-cooled transformer. electrical circuit is close-coupled in t machine so that there is very little rea ance in the circuit and electrical ef ciency is high. This feature permits t maximum use of welding transform capacity for actual welding.

High air pressure up to 1000 psi provided by a compressor driven throu a 5-hp ac motor.

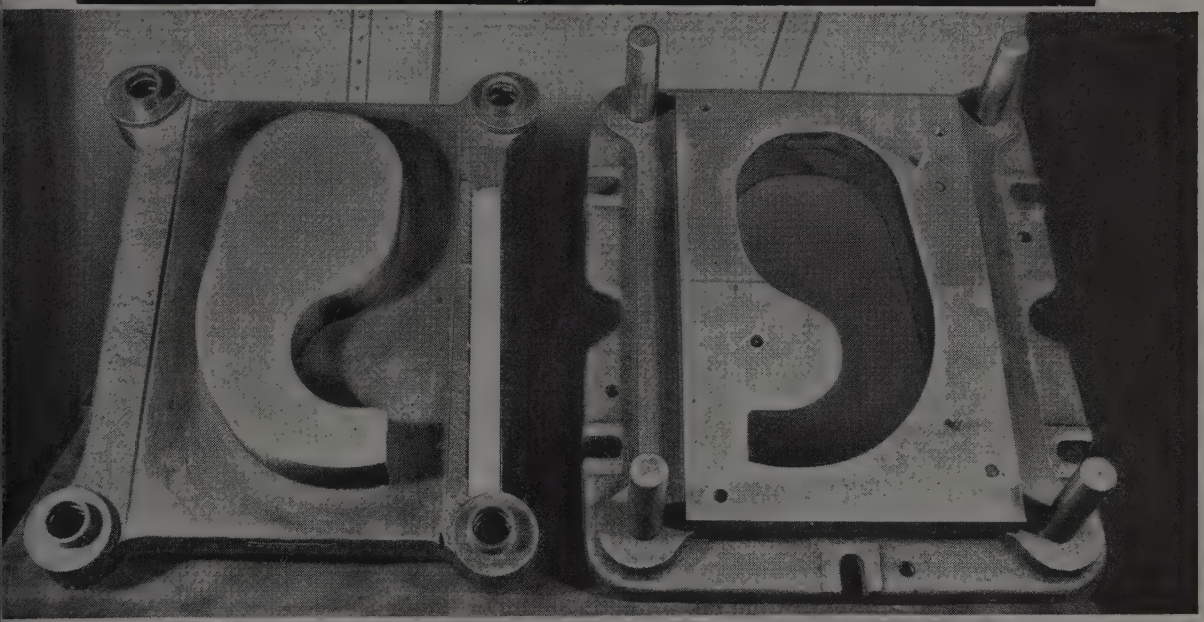
Second new machine is a storage ba tery powered flash welder designed f welding aluminum, which requires e cessive power.

The machine is shown in Fig. 3 flas welding miter joints of extruded alum num window sash. The battery-power unit does the job with a maximum li demand of 18 kva (to keep batter charged) balanced on 3 phases and approximately 90 per cent power fact This is about the same power requi ment as for a 10 to 15 hp 3-phase mot The 16-cell 8 v water cooled batte power pack supplies up to 38,000 am

Combined use of a Reeves varia drive, a cone-drive gear speed redu and a Fawick air clutch-brake takes c of the high acceleration, high up forces, and high deceleration requir Chief reason is that the extremely hi load-carrying capacity of the gear also permits use of a compact gear-b greatly reducing inertia forces at speeds involved. When flash weld aluminum, speeds are 5 to 20 tim as great as for steel since the fl weld cycle is approximately 1/3 to 1 s compared to 3 to 60 sec for steel.

The cam follower roller is carried a pivoted arm which is connected by link to the moving platen, absorbing tangential component developed as

FOR INTRICATE TOOLS AND CROSS SECTIONS THAT REQUIRE DEEP HARDENING



Die and punch for special cutting tool. Made from Mansil Die Steel.

DISSTON
MANSIL DIE STEEL

This is one of the most dependable tool steels er made, and it can be relied upon fully in forging, achining, grinding and heat treatment. Because of nimum distortion and excellent machinability, ansil Die Steel is specially recommended for com- icated dies and punches, particularly where cross ctions must be deeply hardened.

ansil Die Steel can be annealed very soft with the rbides spheroidized for machinability. Upon cor- ct heat treatment this structure changes to a fine artensite. The fracture grain, too, will be fine, nging from 9 to 10 Shepard.

hen properly hardened and drawn, Mansil Die Steel has a tensile strength in excess of 350,000 lbs. per sq. in. At a working hardness of Rockwell C-60 to 61, the elastic limit will be over 300,000 lbs. per sq. in.

Use Mansil Die Steel for cutting, blanking and forming dies and numerous other applications where an exceptionally high quality tool steel is required.

ANALYSIS

Carbon . . .	.90%
Manganese .	1.15%
Chromium . .	.50%
Tungsten . .	.50%

ESTABLISHED 1849 TRADE MARK REG. U.S. PAT. OFF.

ET DISSTON ENGINEERS HELP SOLVE YOUR TOOL STEEL PROBLEMS

Disston engineers and metallurgists will be glad to help you with any tool steel problem that may confront you. Write in confidence, giving full particulars.

ENRY DISSTON & SONS, INC., 226 Tacony, Philadelphia 35, Pa., U. S. A.

. . combination "Automatic" FIRE-FOG and Foam

• IT BLANKETS • IT ISOLATES • IT QUENCHES •

HERE'S an actual photograph of the newest development in the art of fire protection. It's a combination "Automatic" FIRE-FOG and FOAM system which is safeguarding hazardous tube cleaning operations at one of this nation's largest metal producing plants. The FOAM unit is attached directly into the FIRE-FOG piping, thus giving immediate application of both FIRE-FOG and FOAM from one and the same control system. Sensitive heat detectors allow for the system's actuation; and protection of equipment and adjacent areas, as well as control and extinguishment of fire . . . all realized within a moment's time.

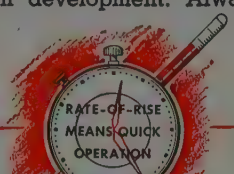
An installation such as this is further proof of "Automatic" Sprinkler's leadership in fire protection development. Always, the difficult problems have been brought to "Automatic" and, with their solution, a wealth of experience has been accumulated — through the test of service.

•

Have you some fire hazard problem that's causing concern? Why not let our engineers and technicians assist in its solution? Write or call "Automatic" Sprinkler Corporation of America, Youngstown 1, Ohio.

•

"Automatic" Sprinkler devices and systems are listed by Underwriters' Laboratories, Inc., and approved by Factory Mutual Laboratories.



THE SUPROTEX* SPRINKLER SYSTEM

A famous member of the "Automatic" Sprinkler Family. Designed particularly for use in manufacturing, mercantiles, warehouses, churches, schools, offices, hospitals, piers and other establishments where positive fire protection is a must.

*Trademark Registered U. S. Patent Office

FIRE PROTECTION
DEVELOPMENT ENGINEERING
"Automatic" Sprinkler
MANUFACTURE INSTALLATION
"AUTOMATIC" SPRINKLER CORPORATION OF AMERICA
YOUNGSTOWN 1, OHIO
OFFICES IN PRINCIPAL CITIES OF NORTH and SOUTH AMERICA

roller hits the upset block in the ca
It thus eliminates the resultant late
thrust which might tend to make
moving platen bind in its ways.

A variation of plus or minus 20
cent in operating voltage of plus
minus 30 per cent in platen feed r
is apparently permissible without affe
ing weld quality. On the battery m
chine, variation in upset current du
tion may be varied from 1/20 to 1
sec without affecting quality of
weld.

Comprehensive Book on Shot Peening Published

Metal working craftsmen have k
known that cold hammering of iron a
steel improves its quality—makes
tougher and more durable. For
stance, the blacksmith continued to ha
mer the spring or sword long after
had cooled below the normal forg
temperature. No longer an art, but
closely defined process, its mod
counterpart is shot peening, and inste
of actual hammering, the surface treat
is done by metallic shot.

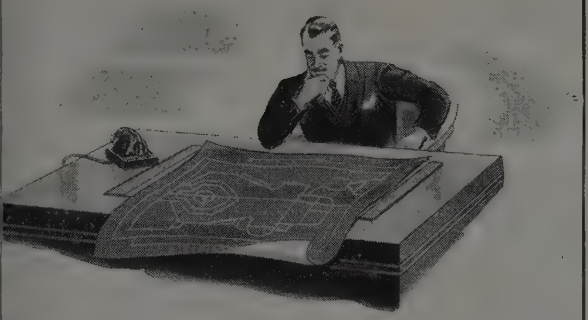
This bit of historical background
shot peening is contained in the bo
entitled "Shot Peening", a recent pu
lication of American Wheelabrator
Equipment Corp., Mishawaka, I
Priced at $1.50 per copy, its 128 pa
contain much data on the benefits of
process, equipment used, the shot a
factors to be considered in using
process itself.

One chapter is devoted to the re
tive merits of airless blasting versus
blasting in shot peening and anot
discusses the sizes, types and mater
used in the shot.

Part II of the book is written by
F. Moore, research professor of eng
eering materials, emeritus, of Univer
of Illinois and a member of the
search committee on fatigue of met
American Society for Testing Mater
Complete with photomicrographs,
grams and tables, it considers the te
nical aspects of shot peening proces

Determines Chain Loads

Maximum safe load that a sling c
can lift at any given angle can be figu
with a computer offered by S. G.
lor Chain Co., Hammond, Ind. To
the hooker sights through the win
of the computer on one leg of the s
chain. He then moves the needle of
computer to line up with the leg
is sighted. Angle of the chain is
at the end of the needle. Safe wor
load for size chain being used may
be found on scale on opposite side
computer.



When you think of Castings

...consider Forgings

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Induction Hardening of Ste

(*Continued from Page* 101)

trated in Fig. 43, where the quench structure of a small sample heated 3 at 850°C is compared with a samp heated 3 hours. Note that the spe men heated 3 hours has more retain austenite, and a slightly lower hardne than the specimen austenitized for 3 The homogenization treatment stabiliz the austenite by lowering the M_s and temperatures. This lowering appears be due to the increase in carbon and loy content of the austenite with hom genization. Accordingly, an inductio hardened sample with undissolved c bides and carbon concentration gradie may contain more martensite (less tained austenite) than a similar st quenched after a longer austenitizi treatment. In general, this appears be true[15, 18]. Furthermore, having l retained austenite, the induction har ened samples should be harder, whi they are[16].

Tempering Martensite: In practi it is a general rule to temper the har ened steel to increase the toughn and decrease the internal stresses. T is a familiar story to metallurgists a many engineers, but the subject of te pering should be considered becau a few exceptions to the general rule cur in induction-hardening applicatio

Martensite in steel is a hard, brit constituent which is undesirable many applications involving high erating or impact loads. To make t steel more serviceable the part is te pered by heating to a low temperatu 100-500°C, to transform it to temper martensite or sorbite. These structu are similar and consist of a fine disp sion of carbide in a ferritic matrix, size of the carbide spheroids increas with increasing tempering temperatu The tempered structures possess a h degree of hardness, and are tough r t the martensite. In spite of this adv tage, it may not be always desira or necessary to temper surface ind tion hardened parts. The reason is t the surface layer in such a sample n be in compression, and these inter stresses may act to improve the fati strength by partially neutralizing ten stresses resulting from operating lo However, there is no rigid rule to low, and many samples of irregu shapes will require tempering to prev cracking. Experience is certainly best guide, and will help in decid when to temper and when not to te per a hardened sample.

Internal Stresses: Undesirable featu of internal stresses, as demonstrated warpage and cracking, were recogni for a long time. It was only in rec years that the value and significance

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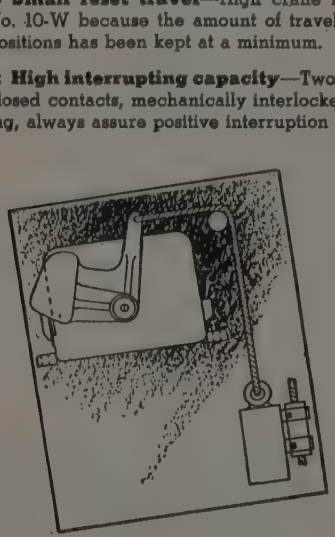

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residual internal stresses were unde stood, although, as pointed out by Alme the idea of prestressing the surface improve the properties is as old as ste itself[38]. Purpose of prestressing the su face of a metal part is to induce resid ual compressive stresses in the surfa layer to counteract tension stresses r sulting from operating loads, and that manner improve the fatigue strengt and wear resistance. Methods of pre compressing the surface of steel are b mechanical deformation, such as rollin or shot peening, or by surface heat trea ments, such as carburizing, nitriding induction hardening.

The metallurgist and the enginee are able to utilize induction hardenin to greater advantage if they have knowledge of the effect of interna stresses on the properties, and recogniz that certain safeguards are required t insure full benefits of induction harden ing. Significant points will be briefl reviewed in this article, but for thos interested in a more detailed accoun the articles by Horger and his asso ciates[39, 40], Almen[41], and Johnson[42] ar highly recommended.

Internal stresses which exist in an in duction hardened part result from: D mensional changes caused by therma expansion and contraction which no mally occurs when the steel is heate and cooled; the phase transformations— alpha to gamma, austenite to martensite etc.—which may occur during heatin and cooling; and plastic deformatio which results from the effect of stresse induced by thermal changes and phas transformations.

Stresses in the part may be tensile c compressive, depending upon the histor and treatment of the steel, and may b beneficial or detrimental depending upo their magnitude and location. They a beneficial if they improve the servic life, and detrimental if they cause crack to form, or lower the properties.

Type of stress pattern obtained in th hardened part will depend upon th martensitic case depth, the temperatur gradient in the part during the marten sitic transformation, and the propertie of the steel in the various structural co ditions (austenitic, pearlitic, etc.). In surface induction-hardened bar the ma tensite in the hardened zone is pr vented from expanding to its full vo ume because of the restraining influen of the attached, unhardened core. Th result of this condition is that the ca is in compression, and the core in te sion. A simple demonstration of th presence of internal compressive stress in such a sample is obtained by cuttin the bar either transversely or longitud nally. Cutting of the hardened case a lows the martensite to expand sufficient to grip the cut-off wheel. Frequently, th

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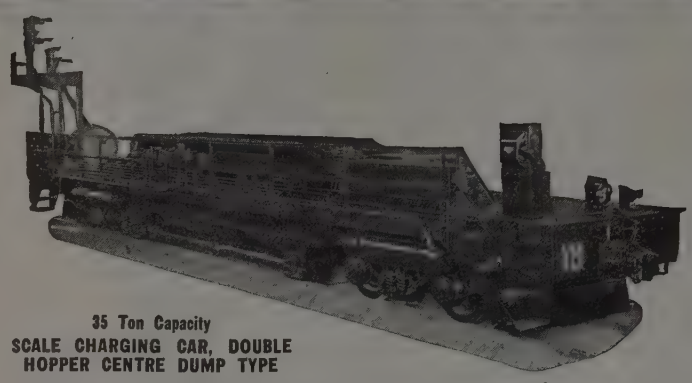

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stresses are high enough to stop a high speed cutting wheel.

Since fatigue failures occur in conjunction with tensile failures, it is possible to partially neutralize tensile stresses which result from external loads by placing the surface in compression and thus improve the fatigue strength of the part. Unfortunately, surface induction hardening does not always result in improved fatigue properties. The so-called heat-affected zone where the steel was heated close to but below the critical temperature is a tension-stressed zone which may promote an internal fatigue failure of the part, or a surface failure if the second zone extends to the surface, as at the end of a localized hardened zone. Almen[41] and Johnson discuss the dangers associated with the harmful second zone, and show that induction hardening may lower the fatigue strength unless precautions are taken. The problem is, first, one of designing the dimensions of the hardened zone so that the second-zone will not impair fatigue properties, and second, of proper selection of equipment and material to enable the heat-treater to obtain the specified case dimensions.

A corrective measure to minimize or eliminate the damaging effect of the heat-affected zone is to shot-peen the surface after induction hardening. Johnson demonstrated the value of this treatment in improving the fatigue strength of a cylindrical specimen with an oil hole[42]. Shot peening should be of particular value where localized areas are hardened and the second zone is exposed to the surface. However, it constitutes an additional operation and will not likely be used, unless required, because of the extra cost.

The idea of designing for induction hardening is not new. Curtis discussed the practical value of designing the part with the object of facilitating the hardening operations[8] and Johnson emphasized the aspect of designing the dimensions and location of the hardened case to improve the service properties. Both types of design are important. It also is evident that many organizations are giving more attention to each with the object of increasing production and improving the service life. The available information on how to design to accomplish these aims is meager, so that definite procedures can not be established. However, general problems of design should be remembered to act as a guide in applying induction hardening to highly stressed machine parts.

Quenching Cracks: Surface of a hardened part is in compression only if the sample is surface hardened. If the part or section is hardened completely through, the stress pattern is different. Instead of the surface being in com-

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pression, it is likely to be in tensio The reason for the reversal in intern stress pattern is that the austenite the center transforms to martensite aft the outside layer has transformed. a result, the coremartensite is prevent by the restraining surface shell from e panding to its full volume. This resu in the core being in compression and t surface in tension. The residual tens stresses in the surface are detrimental b cause they lower the fatigue streng and frequently cause cracking. Two e amples of cracking in high carbon ste are shown in Fig. 45. Sample (a) illu trates spalling or chipping of the edg and (b) shows a severe condition whe the 1-in. diameter cylinder split in four parts.

In induction hardening of gears, t teeth may crack when they are harden completely through. Even if cracks not form, the tensile stresses at the su face may impair the fatigue streng and consequently, tempering to relie the stresses is recommended.

To prevent formation of quenchi cracks it is necessary that the center the section transform to martensite about the same time the austenite the surface transforms. This is possib by an interrupted quench near the M temperature (370° C for a 1050 ste which permits equalization of the te perature gradient between surface a core. On cooling slowly in air to roo temperature from the interrupte quenching temperature, the surface a the core austenite, being at near equal temperatures, will have almo equal quantities of martensite at eve instance. Therfore the damaging stre gradients which cause cracking will n be established. If the induction sampl crack during quenching it may be value to interrupt the water quen when the surface has reachd the M point to allow for temperature equal zation. Another method of decreasi the temperature gradient (and still o tain martensite) is to use oil quenchin

In some instances it is possible prevent cracking by substitution of o steel for another. Alloy steels and hig carbon steels are, in general, more su ceptible to cracking than medium, pla carbon steels. Therefore, it may be po sible to substitute a 1050-type steel f one which may be more susceptible cracking.

(*To be continued*)

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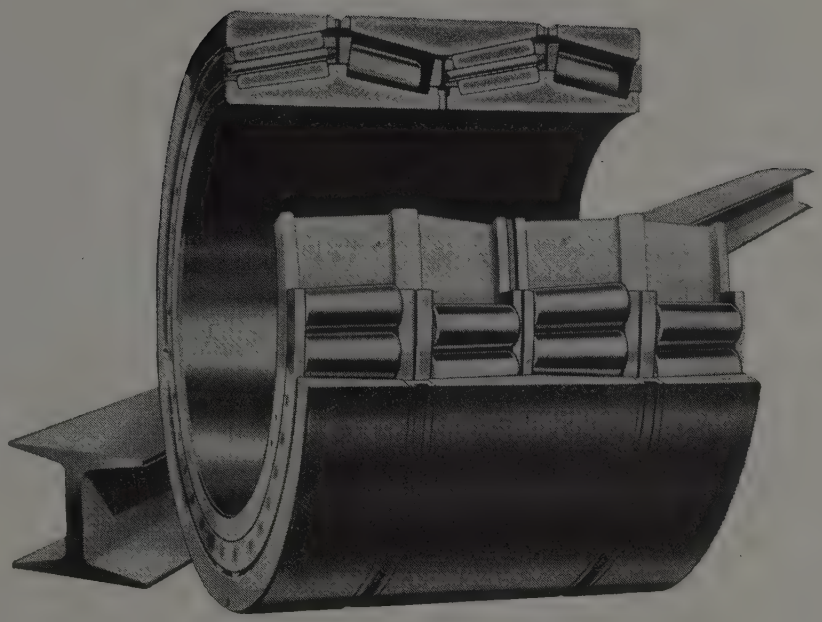

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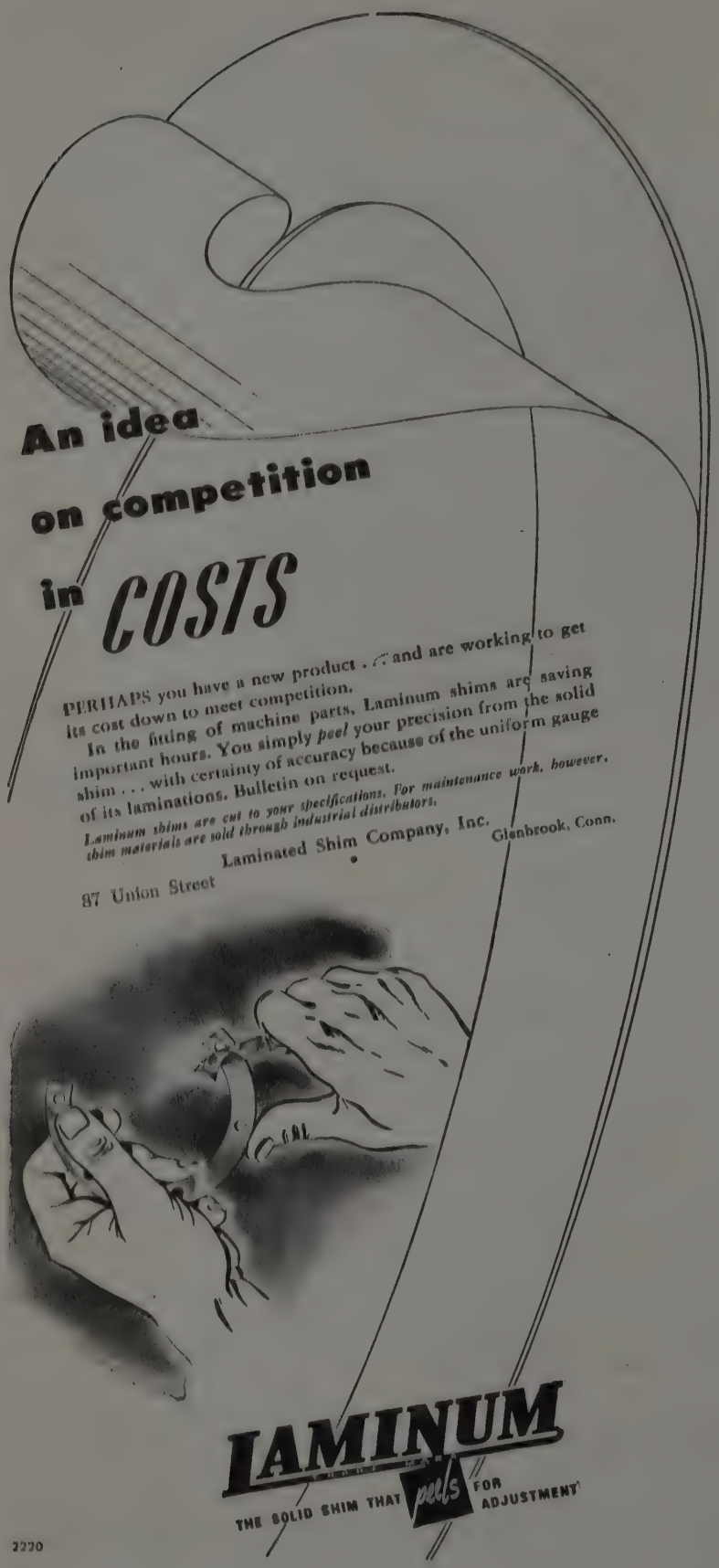
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For all previous references, see STEEL, 18, 20 and 27, pp. 118, 76 and 107 spectively.

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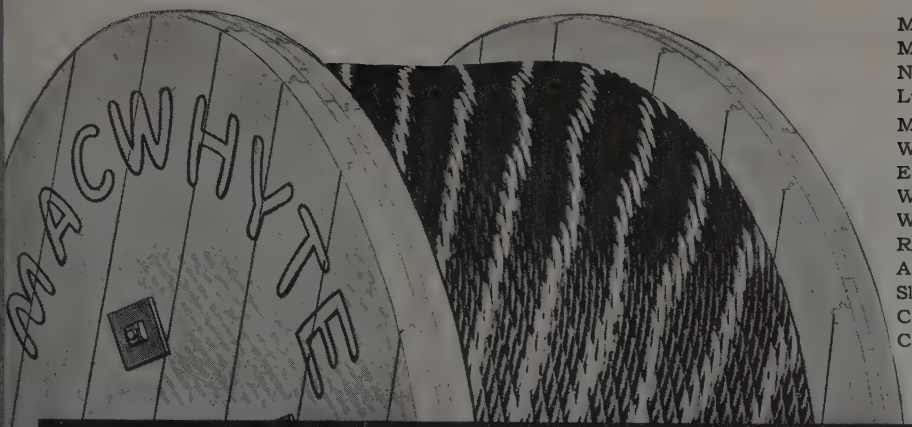

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(*Concluded from Page* 108)

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500 FIRST AND SECOND DRAWS were then run through without a break. No die wear could be noticed, no repolishing of dies was required and ONE DRAWING OPERATION WAS ELIMINATED. Here is another typical case of Kondor's daily service to industry.

KONDOR MAKES MANY VARIETIES of drawing compounds. A Kondor engineer will gladly assist you in analysis of your drawing troubles and recommend the proper Kondor Draw for your particular needs.

WRITE TODAY FOR FREE GENEROUS SAMPLE

KONDOR PRODUCTS
CORPORATION
INDUSTRIAL PROCESSING CHEMICALS
WEST CLIFTON BLVD. AT SLOANE • CLEVELAND 7, OHIO

KONDOR DRAW · Metal Cleaners · Grease Solvents · Rust Solvents · Rust Proofing · Base Compounds · Quenching Oils · SPECTRUM

OFFICES IN PRINCIPAL CITIES OF THE UNITED STATES AND CANADA.

New Cold Mill

(*Concluded from Page* 110)

circulating systems each fitted with duplicate pumps. Should one of these pumps fail, a second pump is automatically brought into commission and this is again protected by an alarm system. The backup roll bearings are supplied from the main oil circulating system with protective alarms. All grease lubricated points are served by a Farval automatic system.

Rectilinear motions on the complete mill are actuated through the medium of hydraulic or compressed air cylinders. The hydraulic power is supplied at 75 psi from a self-contained pumping and accumulator set in the cellar of the mill.

Actual operating control of the mill is from two desks either of which can be selected by the operator through the medium of a selector switch. Each desk carries a full compliment of instruments necessary for the operation of the mill.

Coils will be rolled usually in three passes although five passes may be necessary on the lighter finished gages. The speed range of the mill is 500 to 1000 fpm.

AISI Revises Steel Wheel And Sheet Manuals

Two new revisions to steel product manuals dealing with wrought steel wheels and carbon steel sheets were published recently by the American Iron and Steel Institute, New York. Besides carrying a description of manufacturing processes, section 20, the manual on wrought steel wheels includes specifications and designs, selection of wheels for railroad service, tread failures and computation of stresses in wheel treads.

Classifications and manufacturing practices for coated and uncoated sheet, chemical practices, gage-weight data for uncoated sheets, standard allowable variations, standard methods for packaging, loading and shipping flat and coil sheets comprise the subject matter of the manual on carbon sheets, section

New Line of Keyway Cutters Marketed

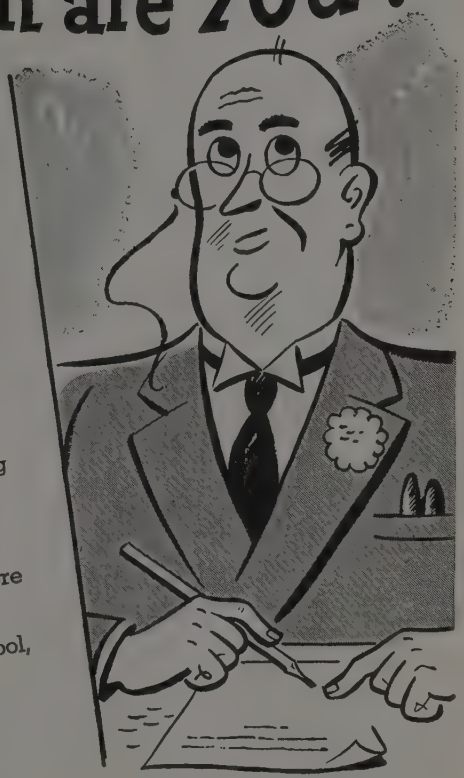
Manufacture of a complete line of keyway cutters and keyway cutter sets which reportedly make possible low cost cutting of standard width keyways of any desired depth is being undertaken by Mont Corp., Greenfield, Mass. Cutters may be used for cutting keyways in gears, pulley hubs, couplings, mill cutters, collars and other parts.

EXECUTIVES:

How Good a Salesman are YOU?

TEST YOURSELF WITH THIS PRODUCT—

Guaranteed to Please Every Customer



CHECK HERE

how many of your employees are buying U.S. Savings Bonds regularly

HERE'S HOW YOU RATE

according to national averages

- ☐ **90%** or more ➡ No one needs to tell you anything about selling.
- ☐ **80%** or more ➡ Excellent.
- ☐ **70%** or more ➡ Not bad. Just apply a little more effort.
- ☐ **60%** or less ➡ This wasn't a high mark in school, either.

The "PRODUCT"—U. S. Savings onds—is easy to sell, because it offers every rospect a guaranteed means of making oney. Each unit can produce $4 for every 3 of purchase price.

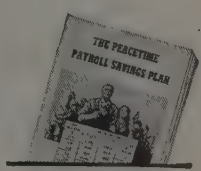
The MARKET consists of all your nployees. It is an eager market, as shown surveys—which indicate that 85% of all rticipants in the Payroll Savings Plan want e plan continued.

The REWARD is twofold: By helping ur employees build personal security, you lp assure that they will be happier, more able—more productive on the job. And u help *all* of us, including yourself, beuse every Bond you sell helps to check flationary tendencies.

Are You Using These Booklets?

If not, or if you wish additional copies, just ask your State Director of the Treasury Department Savings Bonds Division.

THE PEACETIME PAYROLL SAVINGS PLAN—A booklet, published for key executives by the Treasury Department, containing helpful suggestions on the conduct of your payroll savings plan for U.S. Savings Bonds.



THIS TIME IT'S FOR *YOU*—A booklet for employees . . . explaining graphically how the payroll savings plan works . . . goals to save for, and how to reach them with Savings Bonds.

The Treasury Department acknowledges with appreciation the publication of this message by

STEEL

This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and The Advertising Council

H & S WORMS AND WORM GEARS
have 6 outstanding features

1. Glass hard worm surfaces.
2. Worms ground all over to an accuracy of less than .001″.
3. Worms, made from special steel, are hardened to double the usual depth of case.
4. Gear hobs ground exactly to the contour of worm.
5. Bronze for gears made to strict specifications from virgin metals.
6. Inspected on micrometer inspection fixtures.

Send note on Company Letterhead for 488-Page Catalog 41

THE HORSBURGH & SCOTT CO.

GEARS AND SPEED REDUCERS

5112 HAMILTON AVENUE • CLEVELAND, OHIO, U. S. A.

Standard on Tool Life

(*Continued from Page* 116)

affect finish only on the shoulder left the chip removal. Preliminary failure evident by the appearance on this shoulde of a narrow, highly-burnished band. the cut is continued, the band will ke changing, usually getting larger until t time of complete tool failure when t shoulder is completely burnished and t intersection of the shoulder with t cylindrical machined surface is joined a fillet of suddenly increasing radius. T complete failure occurs in a fraction o second.

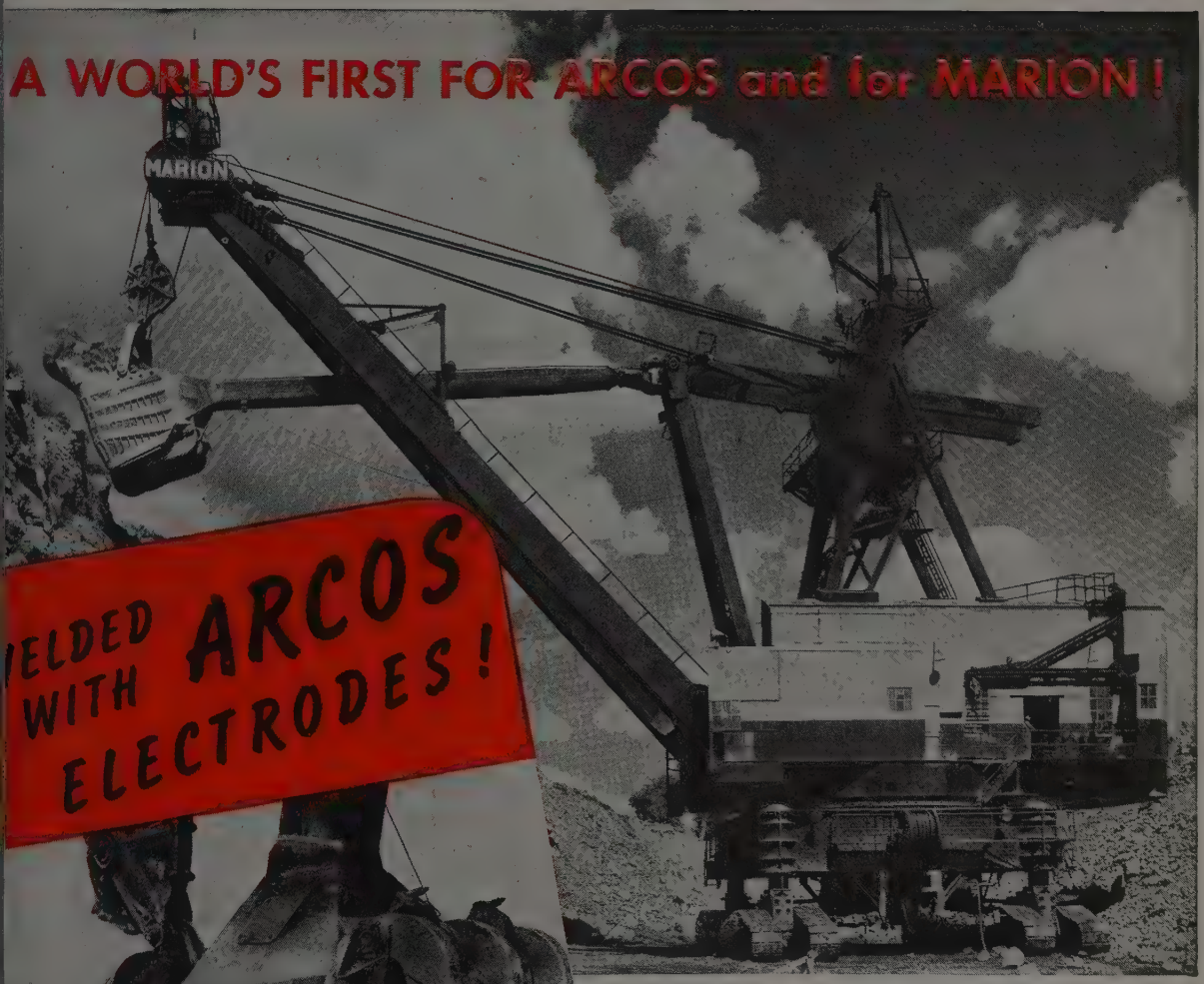
Preliminary failure may occur after t tool has been cutting for a part of its to life. It may occur after 50 per cent or per cent or even 95 per cent of its to tool life, depending upon the particu tool material, tool shape, size of cut, e If the time of preliminary failure is corded along with that for total failure a the points plotted on log-log paper simi to those of total failure in Fig. 4, second line will be obtained somewh lower for the preliminary failure poi than for the final failure points, wh may be parallel to the ultimate fail line or making a small angle with it, sho ing either increased or less slope. some tests this line, based on prelimina failure life, may be used in evaluat tools, materials, as well as in evaluat cutting fluids.

For a given set of test conditions, p liminary failure may be found to g ratings closer to the practical results th final failure. This may be true, parti larly in screw machine work where shape of the work controls the shape the tool as, for example, where a sh shoulder is desired, or in finishing c where uniform surface quality is portant.

When a tool fails by abrasion on flank below the cutting edge, it is usu difficult to observe progressive wear. presence is noted on the surface qua or on the shoulder. However, if fl wear occurs on the tool end, the diame of the work will be increased in prop tion and the surface finish will app more burnished. If it occurs on shoulder, the surface quality of shoulder will become more burnished the tool cuts with zero relief. This c dition continues until sufficient heat generated to cause the tool to fail s denly.

In applying the data obtained f preliminary or final failures to pract shop work, a tool life should be selec somewhat less than that at which liminary failure occurs so that the t may be removed from the machine reground by touching up. This remo less tool material than by regrinding a

A WORLD'S FIRST FOR ARCOS and for MARION!



Dipper capacity, 40 cubic yards. 35,000 pounds saved by ability to weld low alloy high tensile steels.

ELDED WITH ARCOS ELECTRODES!

TO WELD THIS DIPPER required

3,000 pounds of Arcos Chromend 29/9 (Type 312) electrodes (this was 95% of this grade used)

1,300 pounds of Arcos Manganend 2M electrodes (this was 100% of this grade used)

Chromend 29/9—for welding wear resisting, high manganese steel to itself or to low alloy high tensile steels

Manganend 2M—for welding low alloy high tensile steels

IT MEANT LIVING WITH THE JOB

For fifteen months the Research and Field Engineering facilities of Arcos worked diligently with Marion to weld this "first of its kind" alloy job. Electrode recommendations made by Arcos were followed; the techniques of welding developed by Arcos were employed—

Arcos shares with Marion their pride in this accomplishment. Arcos is again "showing the way".

ARCOS

ARCOS CORPORATION • 318 GULF BUILDING, PHILA. 2, PA.

ZONE FORMATION In Galvanized Steel

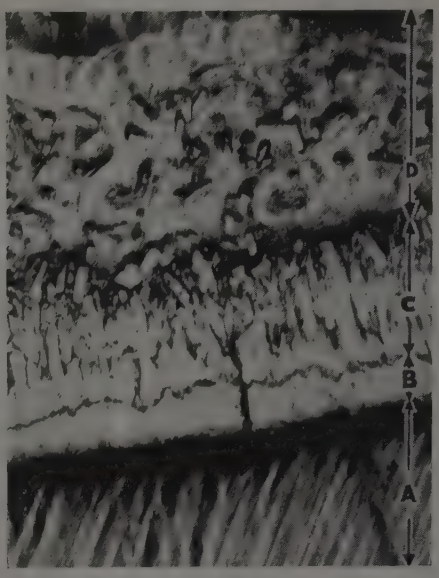
VARIOUS zones that may form during hot dip galvanizing are shown in the accompanying photomicrograph which was taken by Dr. W. R. Meyer, technical director, Enthone Inc., New Haven, Conn.

Zone A is the base metal. Zone B is the extremely brittle Fe_3Zn_{10} zone. Every effort should be made in hot galvanizing to minimize the thickness of this zone. A crack may be noted near the right center of the photomicrograph extending through this zone and into the next. When the Fe_3Zn_{10} zone is very thick due to too long immersion in the molten zinc, shatter cracks may form through the entire zone, and the hot galvanized coatings will have little adhesion.

Zone C consists of a definite structure, usually columnar, designated as $FeZn_7$.

Zone D consists of a free-zinc which may have dispersed throughout $FeZn_7$ platelets. The free-zinc zone which contains a very small amount of iron in solid solution, frequently may be entirely absent if asbestos wiping of the coating may be done, or if the coating be subjected to a strong blast of air.

Best hot galvanizing coatings are those which contain almost no visible iron-zinc alloy zones. Poor pickling or cleaning of the base steel may be responsible for excessive alloy formation due to the need of long immersion time in the molten zinc to penetrate through scale or dirt.



Cross section photomicrograph of a hot galvanized coating 500x

total failure. These practical cutting times should, however, be based on the time of preliminary or total failure.

During the machining of abrasive, short-chip materials, such as cast iron, which cause the tools to fail by flank abrasion, tool life based on a specified amount of flank wear, such as 0.020-in., may be used as a method of determining tool failure and of deciding when the tool should be reground.

A Typical Test: In Fig. 4 are shown the results of cutting speed tool-life tests on two die steels, both heat-treated and tempered to give a brinell hardness of 363. The material was furnished as forgings 6 in. in diameter and 20 in. long. Two different sizes of cut were used when turning dry. One cut was a finishing cut of 0.0125-in. depth and 0.0127-in. feed. The second was a heavier cut of 0.100-in. depth and 0.0127-in. feed. High-speed-steel tools of 18-4-1 type (known as Red Cut Superior) were used. These tool bits were held in a solid steel tool holder 1½-in. wide, 2½-in. deep, and 4 in. long by one set screw on the top. The tool-holder angle was 10½ degrees and setting angle was 90 degrees. The tool point was ground to have working angles of 8, 14, 6, 6, 6, 15, 3/64. The tool bits were ⅜-in. square.

A sample data sheet is shown in accompanying table. Values of cutting-speed tool-life are plotted in Fig. 4. The comparative results are shown as a table in Fig. 4. For the light cut, both steels give the same data, i.e., the same slope n of 0.08 and the same value of C of 181. This means that both lines have the same slope and pass through the same point, therefore the machinability based on cutting-speed tool-life under these conditions is identical and values of V_{10}, V_{80}, and T_{180} are equal. For the heavy cut, the slope as represented by n is 0.11, indicating these lines to be steeper than those for the light cuts. This is disadvantageous. The value of C for steel A is 84, while that for B is only 78 fpm. The former is 6 fpm or 7.7 per cent higher. V_{10} for A as 65.5 and for B is 61. The former is 4.5 fpm, or 7.4 per cent higher. For the light cut, the value of T_{180} is 12 for both steels. For the heavy cut T_{80} is 11.5 min for steel A and 25 min for B. The latter is 117 per cent greater.

These results show that the two steels machine equally well, and favorably with the low slope, at light cuts, but that steel A machines better than B at the heavy cuts. In this same manner, keeping the cutting fluid and material constant, the cutting tools of different shape or material may be evaluated.

From *Industrial Standardization*, publi by American Standards Assoc., New York.

New Potentiometer Suited For Redesigned Equipmen

Line of wire-wound linear poter meters developed by Fairchild Camer Instrument Corp., Jamaica, N. Y., le itself readily to design and produc simplification of many kinds of elect equipment.

Consisting of three models, lin said to give high performance accura For plotted performance, accuracie 0.05 per cent are provided in the lar 5-in. diameter size, and 0.15 per in the smallest, 2-in. size.

Life of models is longer, as provide more than 1,000,000 cycle operation while retaining initial accu Electrical angle of rotation is from to 357 degrees, leaving a maximum wound sector of 8 degrees in the s est size and an unwound sector of 8 grees where maximum wound leng required.

The potentiometers are suited general applications in simplifying ci designs for precise control.

rman Metal Research pers Made Available

andards for steel and aluminum al- used in German aircraft are includ- n the 636-page microfilmed collec- of German metallurgical research rs available from Office of Techni- Services, Department of Commerce, hington. The collection, which is in nan, includes research studies, tech- papers, photographs, drawings and s from Messerschmitt plants in Ober- ergau and Garmisch-Partenkirchen, dating back to 1936.

mong subjects covered are creep vior of aluminum alloys and heat re- nt iron materials at high tempera- , standards and applications of vari- steels used in aircraft, endurance of welded and welded chromium-mo- enum steel tubes under stress and riments on the metal-arc welding of sheets of chromium-molybdenum . Copies of the report, PB-2428, are ed at $43 for the photostat edition 6.50 for the microfilm edition.

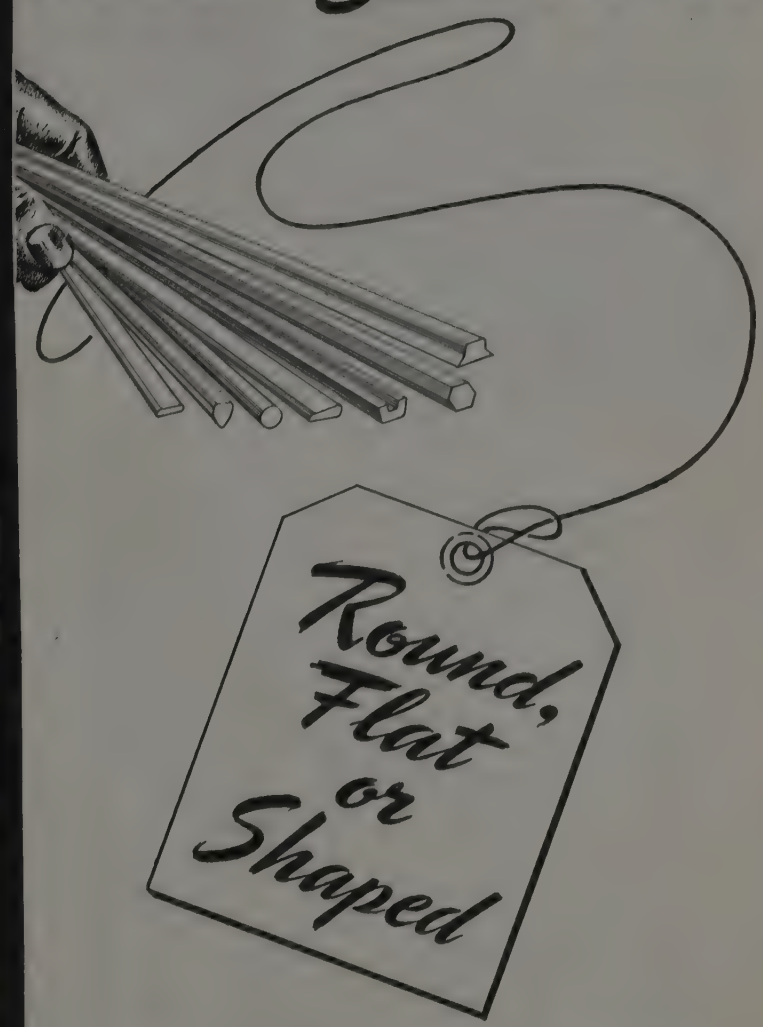
lps Engineers To ecify Right Valve

ronze, iron and steel valves are cov- in a new catalog published recently Ohio Injector Co., Wadsworth, O., to engineers, production men and pur- ing agents in selecting the right valve the job. Illustrated with outside cross sectional wash drawings, 248-page compilation contains alpha- cal and numerical indexes of all es listed as well as telegraph codes. sides analyzing materials used in the es, the publication points out work- and testing pressures for each type alve, a description and data pertain- to a particular valve, along with ice recommendations. Sections are ted to valve accessories and parts, modynamic properties of steam, cir- ferences and areas of circles, metric English equivalent measures, tem- ture conversion and decimal and me- equivalents. Prices and general di- sions are listed with each type of c.

—o—

Many questions concerning lock nuts answered in the booklet recently d by National Screw & Mfg. Co., veland. Included are descriptions of various types of fasteners manu- ured by the company, as well as lication information, price lists, speci- ions, advantages and a section on ulating wrench torques. It includes erous line drawings and photo- hs illustrating principles and appli- ons.

PAGE *Stainless Steel* WIRE

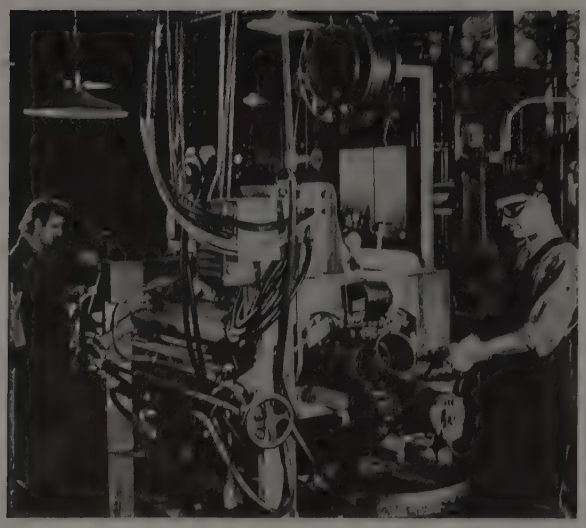


● It isn't boasting to say that we really know something about stainless steel wire. Wire has always been the business of PAGE. And stainless steel wire has been a PAGE specialty almost since the introduction of stainless.

PAGE offers you a responsible source for wire and information about its use in production. High and low carbon steel, Armco iron as well as various analyses of stainless. Get in touch with PAGE.

ACCO Monessen, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, San Francisco, Bridgeport, Conn.

PAGE STEEL AND WIRE DIVISION
AMERICAN CHAIN & CABLE



Continuous Seam Weldin

Maximum speed of 250 in. per minute maintained for several hours using automatic fixture. Rounds, squares and other shapes move continuously under stationary welding head

WARTIME pressure for 75 and 105 mm shell containers created a fixture that is being adapted to peace-time seam welding of rounds, squares and other shapes of tubes and tanks. In the new fixture, welding head remains stationary while work moves continuously under it. This is a departure from the idea of clamping work in a fixture and then moving the welding head along the seam, breaking the weld, unclamping the old work, clamping the new and repeating.

On the automatic seam welding fixture built by Victory Engineering & Machine Works Inc., St. Louis, open butted edge tubes, preformed to a uniform shape are fed one after the other onto the machine. Tubes pass automatically through the fixture, closing up any gap between pieces. Butted edges are closed tight while passing under the Lincoln welding head and off the water-cooled mandrel.

As shown in the accompanying photograph, one operator places the pieces on at the feed end, and another operator lifts to break apart and remove finished pieces at the discharge end. In production, no time is lost in loading work because the weld is carried on from one piece to the next without interruption.

Tolerance of finished work depends upon the dimensions of the shell formed since the two edges of the seam are butted tightly together without changing the dimensions of the circumference. Seam welder has a variable speed range of 60 to 150 in. weld per minute, with reversing and inching controls that can be altered while the work is in motion. After a run of any diameter size, adjustments to any other size can be made in less than half an hour.

One model has a continuous micrometer size adjustment from 4 to 12 in., while two others can be set from 12 to 24 in. and from 24 to 36 in. respectively. Above models can be regulated for wall thicknesses from 18-gage to 3/16-in. Special models can be designed for production jobs limited to one diameter.

In addition to rounds, fixtures can be furnished to handle square tubes with a corner or side weld, also odd shapes of rectangular, triangular, many-sided or kidney shaped, ovals and others.

While in actual operation short lengths are fed without interruption in a continuous line, it is conceivable that a straight tube of indefinite length c be continuously welded, provided necessary conveyor system is arran at each end of the fixture.

Hourly production depends on a easily predicted variables, and can estimated with reasonable accur Eliminating labor interruptions and all ing a safety factor of 25 per cent to c other contingencies, speed of weld is marily dependent on thickness of m being welded; the thicker the gage slower the weld. Allowing for the ab factors which affect average rates, c tinuous welds of the speeds mentio are easily maintained. In one case a m mum speed of 250 in. per min. reached and held for several hours furniture type nonpressure-proof sq tube weld.

Chain type drive of the fixture all practically continuous line contact work. This enables very short len to be run as well as long ones. W gripping of the line contact is powe and positive, it does not leave gripp marks of the fluted drive rolls. Us the fixture is said to have been very cessful with short thick tubes.

Self-Hardening Electrode Is Extrusion Coated

A self-hardening electrode which is extrusion coated for strength and has less tendency to pick up moisture, is offered by Stoody Co., Whittier, Calif., manufacturers, and Air Reduction Sales Co., New York 17, distributors. Having excellent working characteristics with either alternating or direct current, the electrode is also said to have no slag interference and provides more rapid deposition without loss of hardness.

Typical applications given include hard facing in building up worn areas of tractor lugs, manganese steel crushing equipment, wobblers, spindles, coupling boxes, etc.

Latest Fastener Testing Procedure Published

A 16-page booklet describing a procedure for testing the locking effectiveness of self-locking nuts and related fastening devices is offered by Elastic Stop Nut Corp. of America, Union, N. J. N. J.

Prepared by Dr. J. A. Sauer, head of department of engineering mechanics of Pennsylvania State college, the booklet describes equipment and procedures making tests for vibration, installation removal torque, re-use torque, and w ing and plating. Evaluation of these in connection with individual fast problems is also covered.

—o—

First of a series of informative l lets on wire rope is "Correct Hand of Wire Rope", published by Union Rope Corp., Kansas City. Each boo in this series is designed to serve reference manual wherever the pro is used. Copies of the booklet may obtained free of charge by writing company.

mparative Floor Data ren in Flooring Book

new floor covering, Emeri-Crete, ins an aggregate of emery, to which nt and water are added and which d to be nonskid, nonabsorbent and resistant is described in detail in a let issued by its makers, Walter ire Co. Inc., New York.

so included in the booklet are com- ive strength analyses of popular ing materials used in plants and houses. Photographs show installa- in widely diversified industries.

lroad Car lators Reduce Noise

signed to withstand millions of flex- under high stress without distort- from their permanent shape, new er insulators are said to virtually nate noise from railroad passenger according to United States Rubber New York. Known technically as tings, they are placed between the and the body of the car during ruction, intercepting noise produced e wheels on the rails. Several differ- ypes and sizes are required for each the company states.

w Electrode Offered ists Abrasion, Impact

rd-surfacing, high carbon, chrome, bdenum, shielded arc electrode can be deposited on any ferrous l is announced by American Man- se Steel Division, American Brake Co., of Chicago Heights, Ill. It is to be especially suitable for pro- ng ferrous parts subjected to severe ion with or without impact, and uces deposits with a hardness of to 500 brinell. Called Resistwear, rode is offered in coated form only lternating and direct current in 1/8, 3/16 and 1/4 in. diameters, in 14 engths.

s Drill Information

catalog containing information and on twist drills, reamers, counter- , milling cutters, end mills, hobs other standard and special metal ng tools has been published by nal Twist Drill & Tool Co., Roch- Mich. Various types of tools are l in separate sections, located by s of thumb cuts. Each section has own index with combined index ack of book. Tables and charts drilling, milling and gears are in- d in 60-page engineering data sec-

Cut Cost Factors with Clark Tructractors

The New CLARKAT

The Famed CLARKTOR 6

Electric FORK TRUCK

Gas Powered FORK TRUCK

ABOVE EVERYTHING ELSE . . . in the material handling field, Clark Methods and Clark Machines are outstanding, permitting maximum savings in man hours and handling costs. The full story in pictures—"Material Handling News"—is yours for the asking.

CLARK TRUCTRACTOR
Division of CLARK EQUIPMENT COMPANY
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OTHER PLANTS – BUCHANAN, JACKSON, BERRIEN SPRINGS, MICHIGAN

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DRILLS & GEARS
ELECTRIC STEEL CASTINGS
METAL SPOKE WHEELS
AXLES & HOUSINGS
TRANSMISSIONS

Prices on CLARK products will not be advanced in excess of increased costs.

The Business Trend

Present Industrial Pace Equals Postwar High

AFTER a month-long climb, industrial activity as registered on STEEL's industrial production index is now back to approximately the postwar high mark of 158 per cent of the 1936-1939 average of 100.

Prospects for continuation of the high rate are made encouraging by the peacefulness in current labor contract negotiations.

Latest stimulant to the rising rate was automobile output, which in the week ended Jan. 25 was estimated at 94,345 passenger cars, trucks and busses. This was the greatest production since the third week of December.

STEEL—Another factor in the index, steel ingot production, is now as high as at any time since the end of the war. While this is encouraging, the balancing of supply and demand is still some months in the future.

COAL—High rate of bituminous coal production continues, with a result that output for the first three weeks of this year was 2 per cent ahead of that for the corresponding period of last year. Estimated production in the week ended Jan. 18 was 13,220,000 tons.

ELECTRICITY—The present high rate of industrial activity is making a heavy demand for electric power, with a result that electricity distribution in the first four weeks of 1947 was 18 per cent above that for the corresponding period of last year.

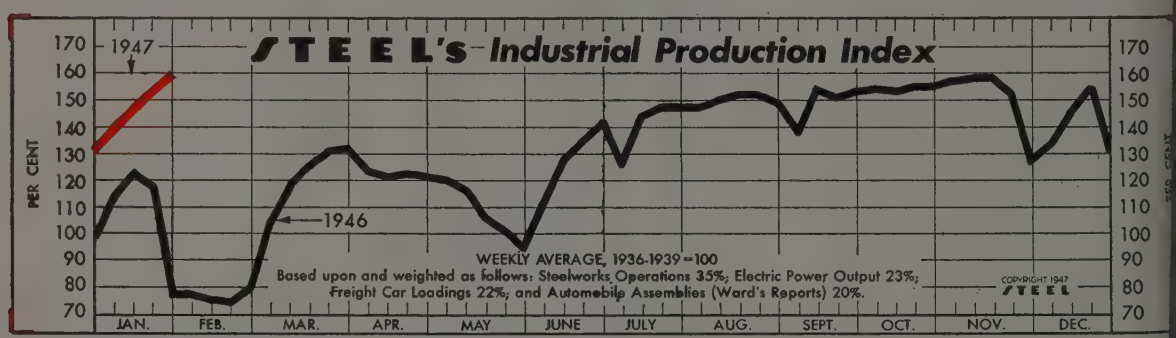
PRICES—With higher prices in all groups except food average primary market prices rose 0.6 per cent to a ne postwar high during the week ended Jan. 18, the U. Bureau of Labor Statistics reported. At 140.8 per cent the 1926 average of 100, the bureau's index of commodit prices in primary markets was 32 per cent above mi January, 1946.

RAILROADS—Using advance reports as a basis, the Ass ciation of American Railroads estimates that railroad o erating revenues in December, 1946, increased 2.7 p cent above the corresponding month in 1945.

STRUCTURAL STEEL—The strangling effect of hig costs in the construction field is reflected in a report fro the American Institute of Steel Construction showing th new orders placed in December for fabricated structur steel were estimated to total only 96,601 tons, lowest f any month in 1946 and opposite the pattern of 1936-194 average. Although December shipments declined fro November, they were still at a substantial level, bein 142,071 tons.

CONSTRUCTION—The month-to-month decline whic has been underway since May in dollar volume of co struction contracts awarded in the 37 eastern states co tinued in December, the estimate for that month bein $457,278,000, according to F. W. Dodge Corp.

INVENTORIES—Actual and prospective increases supplies and a growing selectivity among industrial buye and consumers have led to development of price weakne in some lines, the Federal Reserve Board pointed out warning businessmen to beware of excess inventories.



The Index (see chart above): Latest Week (preliminary) 158 | Previous Week 152 | Month Ago 130 | Year Ago

FIGURES THIS WEEK

INDUSTRY

	Latest Period*	Prior Week	Month Ago	Y A
Steel Ingot Output (per cent of capacity)†	91.5	91	77	
Electric Power Distributed (million kilowatt hours)	4,856	4,857	4,442	4,0
Bituminous Coal Production (daily av.—1000 tons)	2,203	2,283	2,183	2,1
Petroleum Production (daily av.—1000 bbls.)	4,672	4,624	4,713	4,6
Construction Volume (ENR—Unit $1,000,000)	$73.9	$110.2	$34.3	$10
Automobile and Truck Output (Ward's—number units)	94,345	75,166	67,070	29,4

* Dates on request. † 1946 weekly capacity was 1,762,381 net tons.

TRADE

Freight Carloadings (unit—1000 cars)	850†	828	628	
Business Failures (Dun & Bradstreet, number)	52	51	38	
Money in Circulation (in millions of dollars)‡	$28,369	$28,518	$29,163	$27,9
Department Store Sales (change from like week a year ago)‡	+17%	+24%	+26%	+

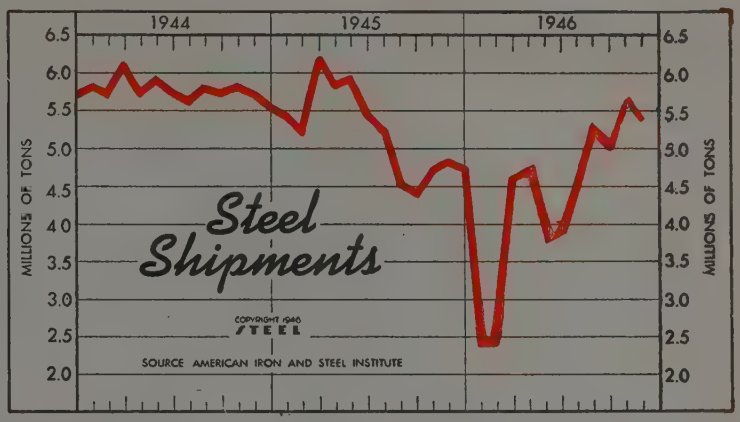
† Preliminary. ‡ Federal Reserve Board.

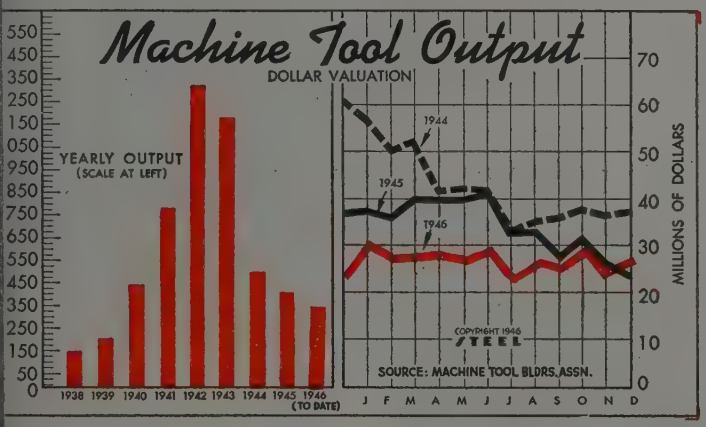
Steel Shipments

(Net Tons)

	1946	1945	1944
....	2,391,850*	5,435,647	5,767,687
....	2,391,849*	5,184,498	5,700,673
....	4,644,988	6,179,452	6,146,595
....	4,698,081	5,769,786	5,744,177
....	3,906,064	5,938,055	5,859,786
....	3,966,628	5,437,206	5,703,314
....	4,639,610	5,214,074	5,597,631
....	5,406,470	4,512,637	5,837,328
...	4,994,377	4,391,143	5,743,437
....	5,675,339	4,660,237	5,752,147
...	5,404,498	4,779,628	5,686,527
....	.....	4,729,561	5,458,133

Figures for January and February, 1946, merely averages derived from a report that bined shipments for those two strike-affected ths into a total of 4,783,699 tons.




Machine Tool Output
DOLLAR VALUATION
YEARLY OUTPUT (SCALE AT LEFT)
1938 1939 1940 1941 1942 1943 1944 1945 1946 (TO DATE)
1944
1945
1946
MILLIONS OF DOLLARS
COPYRIGHT 1946 STEEL
SOURCE: MACHINE TOOL BLDRS. ASSN.
J F M A M J J A S O N D

Machine Tool Shipments

(000 omitted)

	1946	1945	1944	1943
Jan.	$30,263	$37,353	$56,363	$117,384
Feb.	26,949	36,018	50,138	114,594
Mar.	27,326	40,045	51,907	125,445
Apr.	28,108	40,170	41,370	118,024
May	26,580	39,825	41,819	113,859
June	28,580	41,040	41,471	108,736
July	22,360	32,504	32,753	97,541
Aug.	26,911	32,500	35,177	87,805
Sept.	25,468	27,300	35,889	85,842
Oct.	29,140	31,200	37,516	78,302
Nov.	26,176	26,000	36,277	71,811
Dec.	27,587	28,200	36,784	60,873
Total	$325,448	$407,155	$497,464	$1,180,216

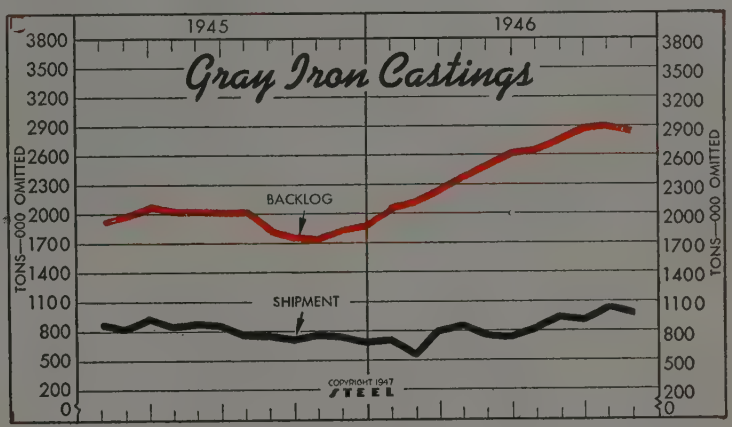
Gray Iron Castings

(U. S. Bureau of Census)

Tons—000 omitted

Shipments		Backlogs*	
1946	1945	1946	1945
706	862	2,077	1,922
541	816	2,153	1,998
796	928	2,265	2,089
857	843	2,378	2,032
757	867	2,492	2,031
735	849	2,633	2,016
811	749	2,669	2,015
945	750	2,786	1,818
914	718	2,882	1,755
1,051	767	2,916	1,742
964	751	2,888	1,847
....	678	....	1,877
Ave.. ...	798	....	1,928

Unfilled orders for sale to the trade.



ANCE	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$13,093	$12,105	$12,782	$12,552
Federal Gross Debt (billions)	$259.7	$259.5	$262.6	$278.6
Bond Volume, NYSE (millions)	$22.2	$26.7	$21.0	$35.3
Stocks Sales, NYSE (thousands)	4,426	5,896	5,120	10,142
Loans and Investments (billions)†	$56.1	$55.6	$56.9	$68.2
United States Gov't. Obligations Held (millions)†	$36,231	$35,802	$36,559	$49,629

† Member banks, Federal Reserve System.

CES				
STEEL's composite finished steel price average	$69.36	$69.36	$64.91	$58.27
All Commodities†	140.8	140.0	139.8	106.7
Industrial Raw Materials†	153.3	153.1	155.5	118.7
Manufactured Products	136.4	135.4	134.2	102.9

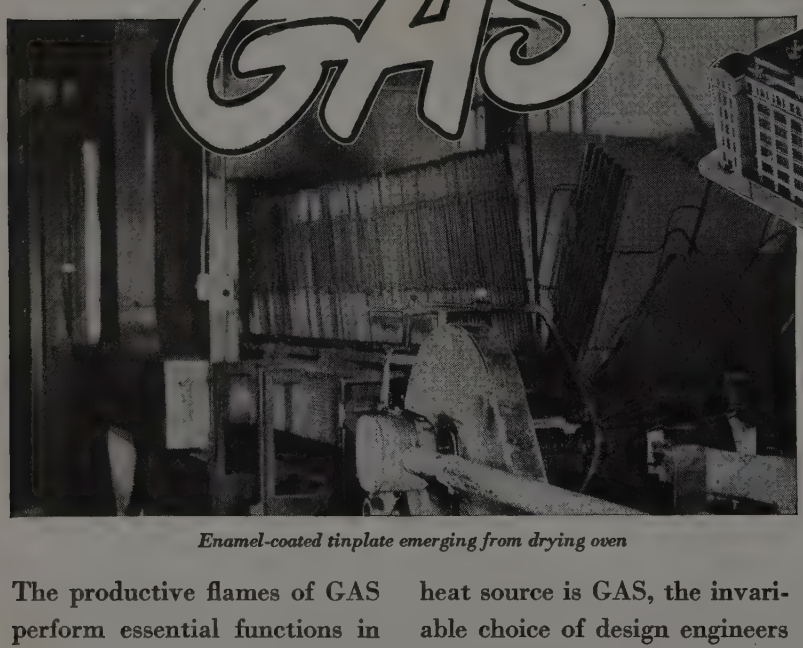
† Bureau of Labor Statistics Index, 1926=100.

OPERATION: Can Manufacturing

HEATING APPLICATIONS:

- Joint Preheating
- Seam Soldering
- Enamel Coating
- Lithograph Drying

FUEL: GAS



Enamel-coated tinplate emerging from drying oven

American Can Company Plant, Brooklyn, N. Y.

The productive flames of GAS perform essential functions in the manufacture of cans for the foods and beverages packaged by the giant canning industry.

American Can Company's trademark is a familiar sight on the grocery shelf because so many of the best foods are preserved in CANCO cans. As a leading producer, American Can Company has developed streamlined equipment in which heat is a production tool and the heat source is GAS, the invariable choice of design engineers who require fuel flexibility.

For lithograph ovens where uniform temperatures are essential to maintain color tones, in body-making machines where the joint-seal requires pre-heating and solder-melting, in tunnel ovens for enamel-drying the remarkably precise controllability of modern GAS equipment is amply evident.

Labor-saving automatic controls, clean and pleasant working conditions, availability and dependability of supply make GAS the preferred fuel for all process heating. Your local Gas Company will recommend methods for applying GAS to your industrial processes.

MORE AND MORE...
THE TREND IS TO GAS
FOR ALL INDUSTRIAL HEATING

AMERICAN GAS ASSOCIATION

420 LEXINGTON AVENUE, NEW YORK 17, N. Y.

teel Ingot Production Rises o Highest Rate Since 1945

Producers confident they will be able to maintain output at high rate for some months to come, now that labor outlook has brightened. Price revisions continue to be made

STEEL ingot production increased to a new postwar gh last week, the estimated national operating rate adncing one point to 92.5 per cent of rated capacity. This s the highest rate attained since May, 1945. Extenn of the present wage agreement with the steelworkers' ion until Apr. 30 assures producers of the largest peacee first quarter output in history and will afford them an portunity to reduce their large volume of unfilled busiss.

While a shortage of raw materials still prevails, notably pig iron and scrap, steel producers nevertheless are conent they will be able to maintain production at a high e for some months to come, now that the labor outlook s brightened considerably. Given six months of uninrupted output, they believe they will be able to do ch toward bringing supply and demand into balance most products. However, there will be a continued ingency in light flat-rolled products until well into next ar, on the basis of present prospects.

Reflecting pressure for raw materials, prices on scrap stronger, especially in the eastern districts where Pittsrgh mills are competing actively for material. One tern pig iron producer has advanced prices on all grades a ton, following an increase of $2 a ton late last year. gh silicon silvery pig iron has been increased $2 per . An advance of one cent a pound in electrolytic cop- by a leading producer was not followed last week by er major interests, the market being quoted at a range 19.50c to 20.50c, Connecticut valley.

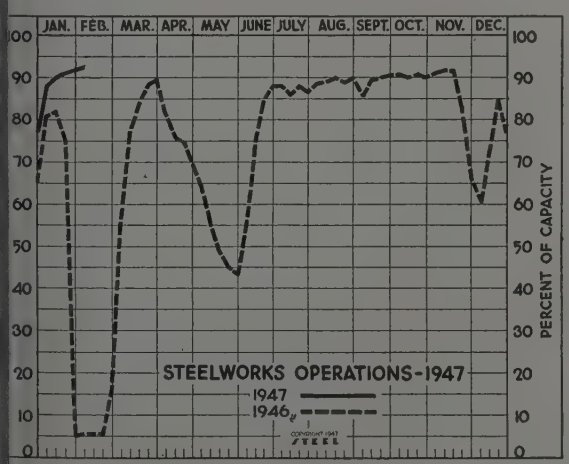
While base prices for finished steel products held unchanged last week, there were several important developments in the market pricewise. New arbitrary delivered prices were established for Detroit and eastern Michigan, the differentials now being 15 and 20 points, respectively, over principal basing point prices. A leading producer of cold-rolled strip issued a new schedule of extras while another producer issued a new classification of all flat rolled products by sizes and revised its schedule of extras.

Plate producers are adjusting future schedules so as to provide more tonnage for railroad car builders. While details have not yet been announced, it appears that some increases in car tonnage will become effective as early as March, with a view to permitting an increase in the output of freight cars to at least 7000 units monthly as soon as possible. Certain producers, selling on a quarterly basis, have been holding up on establishment of quotas for the second quarter until the situation with respect to car tonnage becomes clarified. Indications late last week were that most details had been ironed out, with a result that early action on general sales quotas for next quarter should be expected soon.

Meanwhile, some producers, who all along have been accepting tonnage for shipment well into the future, estimate that with the additional car steel load now contemplated, they will have no capacity left for acceptance of tonnage before the fourth quarter, and at least one declares he is now out of the market for the entire year.

STEEL's composite market average for scrap rose to $31.33 from $31.17 per ton while those for finished steel held at $69.36, for semifinished steel at $52.10, and for steelmaking pig iron at $29.56.

Steelmaking operations rose one point to 92.5 per cent as production increased three points to 95 per cent in Cleveland, two points at Detroit and in New England to 92 per cent and 84 per cent, respectively, one and one-half points at Pittsburgh and St. Louis to 100.5 per cent and 62 per cent, respectively, and one point in eastern Pennsylvania to 88 per cent. Operations at other leading producing points held unchanged.



DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged

DISTRICT STEEL RATES in Leading Districts

	Week Ended Feb. 1	Change	Same Week 1946	Same Week 1945
Pittsburgh	100.5	+ 1.5	1.5	87.5
Chicago	90	None	5	99.5
Eastern Pa.	88	+ 1	4	93
Youngstown	88	None	0	80
Wheeling	89	None	56	97.5
Cleveland	95	+ 3	0	79.5
Buffalo	90.5	None	0	43
Birmingham	99	None	0	95
New England	84	+ 2	10	94
Cincinnati	91	None	44	95
St. Louis	62	+ 1.5	19	75
Detroit	92	+ 2	32	87
Estimated national rate	92.5	+ 1	5.5	91

Based on weekly steelmaking capacity of 1,762,381 net tons for 1946; 1,831,636 tons for 1945; 1,791,287 tons for 1944.

COMPOSITE MARKET AVERAGES

	Feb. 1	Jan. 25	Jan. 18	One Month Ago Jan., 1947	Three Months Ago Nov., 1946	One Year Ago Feb., 1946	Five Year Ago Feb., 1942
Finished Steel	$69.36	$69.36	$69.36	$69.11	$64.45	$60.91	$56.73
Semifinished Steel	52.10	52.10	52.10	49.20	40.60	39.20	36.00
Steelmaking Pig Iron	29.56	29.56	29.56	29.56	27.50	24.75	23.00
Steelmaking Scrap	31.17	31.17	31.17	31.17	22.22	19.17	19.17

Finished Steel Composite:—Average of industry-wide prices on sheets, strips, bars, plates, shapes, wire, nails, tin plate, standard and line pip
Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:
Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scr
Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania. Finished steel, net tons; others, gross ton

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished material (except tin plate) and wire rods, cents per lb; coke, dollars per net ton; others, dollars per gross ton.

Finished Material

	Feb. 1, 1947	Jan., 1947	Nov., 1946	Feb., 1946
Steel bars, Pittsburgh	2.60c	2.60c	2.50c	2.375c
Steel bars, Philadelphia	2.98	2.98	2.86	2.695
Steel bars, Chicago	2.60	2.60	2.50	2.375
Shapes, Pittsburgh	2.50	2.462	2.35	2.225
Shapes, Philadelphia	2.64	2.602	2.48	2.340
Shapes, Chicago	2.50	2.462	2.35	2.225
Plates, Pittsburgh	2.65	2.612	2.50	2.375
Plates, Philadelphia	2.85	2.777	2.558	2.425
Plates, Chicago	2.65	2.612	2.50	2.375
Sheets, hot-rolled, Pittsburgh	2.50	2.50	2.425	2.3125
Sheets, cold-rolled, Pittsburgh	3.20	3.20	3.275	3.1625
Sheets, No. 10 galv., Pittsburgh	3.55	3.55	†4.05	†3.875
Sheets, hot-rolled, Gary	2.50	2.50	†2.425	†2.3125
Sheets, cold-rolled, Gary	3.20	3.20	3.275	3.165
Sheets, No. 10 galv., Gary	3.55	3.55	†4.05	†3.875
Hot-rolled strip, Pittsburgh	2.50	2.50	2.35	2.225
Cold-rolled strip, Pittsburgh	3.20	3.20	3.05	2.925
Bright basic, bess, wire, Pittsburgh	3.425	3.420	3.05	2.90
Wire nails, Pittsburgh	4.125	4.062	3.75	3.075
Tin plate, per base box, Pittsburgh	$5.75	$5.75	*$5.25	*$5.125

* Nominal. † Base changed in December to 10 gage.

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$58.00	$52.25	$38.00	$37.00
Slabs, Pittsburgh, Chicago	51.00	48.00	39.00	37.50
Rerolling billets, Pittsburgh	51.00	48.00	39.00	37.50
Wire rods ¼ to 5/32-inch, Pitts.	2.675c	2.675c	†2.30c	2.225c

† Base changed in December from 24 gage to 10 gage.

Pig Iron

	Feb. 1, 1947	Jan., 1947	Nov., 1946	Feb 194
Bessemer, del. Pittsburgh	$31.83	$31.815	$29.77	$26.9
Basic, Valley	30.00	30.00	28.00	25.0
Basic, eastern del. Philadelphia	32.01	31.99	29.93	27.4
No. 2 fdry., del. Pgh. N. & S. sides	31.33	31.315	29.27	28.4
No. 2 fdry., del. Philadelphia	32.51	32.49	30.43	27.4
No. 2 foundry, Chicago	30.50	30.50	28.50	25.5
Southern No. 2, Birmingham	26.88	26.88	24.88	22.3
Southern No. 2, del. Cincinnati	31.75	31.75	28.94	26.4
Malleable, Valley	30.50	30.50	28.50	25.5
Malleable, Chicago	30.50	30.50	28.50	25.5
Charcoal, low phos., fob Lyles, Tenn.	37.50	37.50	33.00	33.0
Gray forge, del. McKees Rocks, Pa.	30.66	30.65	28.61	25.6
Ferromanganese, fob cars, Pittsburgh	140.00	140.00	140.00	140.0

Scrap

Heavy melting steel, No. 1, Pittsburgh	$32.50	$32.50	$23.00	$20.0
Heavy melt. steel, No. 2, E. Pa.	31.50	31.00	21.90	18.5
Heavy melting steel, Chicago	30.00	30.00	21.75	18.5
Rails for rolling, Chicago	38.50	35.688	24.25	22.2
No. 1 cast, Chicago	42.50	41.25	29.00	20.5

Coke

Connellsville, furnace ovens	$8.875	$8.812	$8.75	$7.5
Connellsville, foundry ovens	9.875	9.812	9.50	8.5
Chicago, by-product fdry., del.	16.10	15.912	15.10	13.5

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Finished steel quoted in cents per pound and semifinished in dollars per gross ton, except as otherwise noted. Delivered prices do not include the 3 per cent federal tax on freight.

Semifinished Steel

Carbon Steel Ingots: Rerolling quality, standard analysis, price negotiated, fob mill. Copperweld Steel Co., electric furnace melted carbon ingots, $55-$60, Warren, O. Forging quality, $40, Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown.

Alloy Steel Ingots: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, Coatesville, uncrop, $52.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $42; Portsmouth Steel Corp., $55-$60, Portsmouth, O. Detroit, del., $45.36; eastern Mich., $46.48.

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $50; Detroit, del., $53.36; eastern Mich., $54.48.

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $61; del. Detroit $64.36; eastern Mich., $65.48.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $50; Portsmouth Steel Corp., $66 Portsmouth, O.

Skelp: Pittsburgh, Chicago, Sparrows Point, Youngstown, Coatesville, lb 2.35c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, ¼ to 5/32-in., inclusive, $2.55-$2.80 per 100 lb. Galveston base, $2.65. Worcester, add $0.10.

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3-in.: Pittsburgh, Youngstown, Chicago, Gary, Cleveland, Buffalo, Birmingham base, 20 tons one size, 2.60c; Duluth, base, 2.60c; Detroit, del., 2.75c; eastern Mich., 2.80c; New York, del., 3.01c; Phila., del., 2.98c.

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.

Hot-Rolled Alloy Bars: Pittsburgh, Youngstown, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 3.05c; Detroit, del., 3.20c; eastern Mich., 3.25c. (Texas Steel Co. uses Chicago base price as maximum fob Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base, 20,000-39,999 lb, 3.20c; Detroit, 3.35c; Toledo, 3.40c.

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base, 3.80c; Detroit, del., 3.95c; eastern Mich., 4.00c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base, 2.45c; Detroit, del., 2.60c; eastern Mich. and Toledo, 2.65c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo, base, 2.45c; Detroit, del., 2.60c; eastern Mich. and Toledo, del., 2.65c.

Iron Bars: Single refined, Pitts., 6.15c; double refined, 7.00c; Pittsburgh, staybolt, 7.85c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base, 2.50c; Detroit, del., 2.65c; eastern Mich., del., 2.70c; Philadelphia, del., 2.70c; New York, del., 2.79c. (Andrews Steel Co., quotes on Middletown, base for shipment to Detroit area; Alan Wo Steel Co., Conshohocken, Pa., quotes 3.1 Sparrows Point Md., base; Granite City St Co., 2.875c, fob Granite City, Ill., 2.775c, Gary or Birmingham.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cle land, Gary, Buffalo, Youngstown, Middleto base, 3.20c; Granite City, base, 3.30c; Detr del., 3.35c; eastern Mich., del., 3.40c; N York, del., 3.61c; Philadelphia, del., 3.58c.

Galvanized Sheets, No. 10: Pittsburgh, Chica Gary, Birmingham, Youngstown, Sparro Point, Middletown, base 3.55c; New York, d 3.84c; Philadelphia, del., 3.75c.

Corrugated Galvanized Sheets, No. 10: Pit burgh, Chicago, Gary, Birmingham, base, 3.5

Culvert Sheets, No. 16, not corrugated, cop alloy; Pittsburgh, Chicago, Gary, Birmingha 4.15c; Granite City, 4.25c; copper iron 4.5 pure iron, 4.50c.

Aluminized Sheets, No. 20 hot-dipped, coils cut to lengths: Pittsburgh, 9.00c.

Long Ternes, No. 10: Pittsburgh, Chica Gary, base, 3.55c.

Enameling Sheets, No. 12: Pittsburgh, Chica Gary, Cleveland, Youngstown, Middleto base, 3.55c; Granite City, base, 3.65c; Detr del., 3.70c; eastern Mich., 3.75c.

Electrical Sheets, No. 24: Pittsburgh, Chica Gary base prices: Field grade, 4.20c; ar ture, 4.50c; electrical, 5.00c; motor, 5. dynamo, 6.45c; Granite City base prices points higher.
Pittsburgh, Chicago, Gary base prices: Tra former 72, 6.95c; 65, 7.65c; 58, 8.35c; 9.15c.

t-Rolled Strip: Pittsburgh, Chicago, Gary, eveland, Birmingham, Youngstown. Middlevn, base, 2.50c; Detroit, del., 2.65c; eastern ch., del., 2.70c. (Superior Steel Corp., 3.30c, tsburgh).

id-Rolled Strip, 0.25 carbon and less: Pittsgh, Cleveland, Youngstown, 3.20c; Chicago, se, 3.30c; Detroit, del., 3.35c; eastern Mich., 0c; Wooster, base, 3.40c. (Superior Steel rp., 4.70c, Pittsburgh.)

id-Finished Spring Steel, 0.26-0.50 carbon: tsburgh, Cleveland, base, 3.03c; add 0.20c Worcester.

in, Terne Plate

n Plate: Pittsburgh, Chicago, Gary, Warren, 100-lb base box, $5.75; Granite City, Birngham, Sparrows Point, $5.85.

ectrolytic Tin Plate: Pittsburgh, Gary, Warn, O., 100-lb base box 0.25 lb tin, $4.85; 0.50 tin, $5.05; 0.75 lb tin, $5.25; Granite City, rmingham, Sparrows Point, $4.95, $5.15, 35, respectively.

n Mill Black Plate: Pittsburgh, Chicago, ry, Warren, O., base 29-gage and lighter, 50c; Granite City, Birmingham, Sparrows int, 3.70c.

anufacturing Ternes (Special Coated): Pittsrgh, Chicago, Gary, 100-base box, $4.90; anite City, Birmingham, Sparrows Point, 00.

ofing Ternes: Pittsburgh base per package 2 sheets; 20 x 28 in., coating I. C. 8-lb 3.50; 15-lb $15.50.

lates

rbon Steel Plates: Pittsburgh, Chicago, ry, Cleveland, Birmingham, Youngstown, arrows Point, 2.65c; Coatesville, Claymont, neva, Utah, 2.80c; New York, del. 2.94c; ila., del., 2.85c; St. Louis, del., 2.74c; Bosn, del., 2.86c.
entral Iron & Steel Co., Harrisburg, Pa., 0c, basing points; Alan Wood Steel Co., nshohocken, Pa., 2.80c, Coatesville and Claynt equivalent.)

oor Plates: Pittsburgh, Chicago, 3.90c.

ven-Hearth Alloy Plates: Pittsburgh, Chicago, 87c; Coatesville, 4.15c.

ad Steel Plates: Coatesville, 10% cladding: kel clad, 21.50c; inconel-clad, 30.00c; monel-d, 29.00c.

hapes

ructural Shapes: Pittsburgh, Chicago, Gary, rmingham, Buffalo, Bethlehem, 2.50c; Gena, Utah, 2.65c; New York, del., 2.70c; Phila., ., 2.64c.
hoenix Iron Co., Phoenixville, Pa., nominally, 05c, Bethlehem, Pa., equivalent.)

eel Piling: Pittsburgh, Chicago, Buffalo, per 100 lb.

Wire and Wire Products

ob Pittsburgh, Chicago, Cleveland and Birngham per 100 pounds).

re to Manufacturers in carloads

ight, basic or bessemer	*$3.30-$3.55
ring (except Birmingham)	**$4.25

ire Products to Trade
ails and Staples

andard and cement-coated	†$3.75-$4.50
alvanized	‡$3.75-$4.50

ire, Merchant Quality

nealed (6 to 8 base)	$3.95
alvanized (6 to 8 base)	$4.40
ob Pittsburgh, Chicago, Cleveland, Birmingm, per base column)	
oven fence, 15 gage and heavier	84
arbed wire, 80-rod spool	94
arbless wire, twisted	94
nce posts	††82
le ties, single loop	86

* Add $0.10 for Worcester, $0.05 for Duluth d $0.535 for Pacific ports.
** Add $0.10 for Worcester, $0.25 for Duluth d Trenton, N. J., $0.535 for Pacific ports.
† Add $0.30, Worcester, $0.535, Pacific ports.
‡ Add $0.535 for Pacific ports.
§ Add $0.10, Worcester; $0.735, Pacific ports.
†† Add 2 for Duluth.

ails, Supplies

ails: Standard, over 60-lb, fob mill, $2.50 per 0 lb. Light rails (billet), Pittsburgh, Birmingm, $2.85 per 100 lb.

Relaying, 35 lb and over, fob railroad and basing points, $31-$33 per net ton.

Supplies: Track bolts, 6.50c; heat treated, 6.75c. Tie plates, $2.80 per 100 lb, fob mill. Splice bars, $3 per 100 lb. Standard spikes, 3.65c-4.50c; screw spikes, 5.30c-6.40c.

Tubular Goods

Standard Pipe: Base price in carloads, threaded and coupled, to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind., 2 points less on lap weld and 1 point less on butt weld on sizes produced in that district. Pittsburgh base only on wrought iron pipe.

Butt Weld

	Steel		Iron		
In.	Blk.	Gal.	In.	Blk.	Gal.
⅛	48	28	¼	— 2	+20
¼ & ⅜	51	30½	⅜	—11½	+10
½	55½	41	1-1¼	—17	+ 2
¾	58½	45	1½	—22½	— 1½
1-3	60½	47½	2	—23	— 2

Lap Weld

	Steel		Iron		
In.	Blk.	Gal.	In.	Blk.	Gal.
			1¼	— 1	+20
2	53	39½	1½	— 7	+13
2½-3	56	42½	2	—14½	+ 5½
3½-6	58	44½	2½-3½	—17	+ 1½
*8	58	42½	4	—21	— 4
*10	57½	42	4½-8	—19	— 2½
*12	56½	41	9-12	—10	+ 7

* Not T. & C.

Seamless Steel

In.	Blk.	Gal.	In.	Blk.	Gal.
2	52	38½	*8	57	42
2½-3	55	41½	*10	56½	42
3½-6	57	43½	*12	55½	41

* Not T. & C.

Line Pipe

In.	Seamless	In.	Butt Weld
2	51	⅛	47
2½ & 3	54	¼ & ⅜	50
3½ to 8	56	½	54½
10	55½	¾	57½
12	54½	1 to 3	59½

Boiler Tubes: Net base prices per 100 feet, fob Pittsburgh, in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O.D.		—Seamless—		—Elec. Weld—	
Sizes	B.W.G.	Hot Rolled	Cold Drawn	Hot Rolled	Cold Drawn
1"	13	....	$10.89	$10.62	$10.62
1¼"	13	....	12.90	10.59	12.58
1½"	13	$12.00	14.26	11.70	13.90
1¾"	13	13.65	16.23	13.31	15.82
2"	13	15.29	18.17	15.00	17.95
2¼"	13	17.05	20.26	16.71	20.00
2¼"	12	18.78	22.31	18.38	22.00
2½"	12	20.57	24.43	20.11	24.07
2¾"	12	21.80	25.89	21.27	25.46
3"	12	22.87	27.18	22.26	26.68
3¼"	11	26.88	31.94	26.15	31.33
3½"	11	28.86	34.30	28.06	33.64
4"	10	35.82	42.55	34.78	41.68
4½"	9	47.48	56.42	....	....
5"	9	54.96	65.30	....	....
6"	7	84.38	100.25	....	....

Pipe, Cast Iron: Class B, 6-in. and over, $65 per net ton, Birmingham; $70, Burlington, N. J.; $75.56, del., Chicago; 4-in. pipe, $5 higher, Class A pipe, $3 a ton over class B.

Bolts, Nuts

Fob Pittsburgh, Cleveland, Birmingham, Chicago; add 15c per cwt, Lebanon, Pa. Additional discounts: 5 for carloads; 15 for full containers, except tire, step and plow bolts.

Carriage and Machine

½-in. and smaller; up to 6 in. in length	55 off
⅝ and ⅝, up to 6 in. in length	52 off
¾ x 6 in.	49 off
⅞ and 1 in. x 6 in. length	51 off
1⅛ in. and larger in all lengths and ⅛ in. and larger in lengths over 6 in.	48 off
½ in. and smaller, longer than 6 in.	45 off
Tire bolts	38½ off
Step bolts	46 off
Plow bolts	57 off

Stove Bolts

In packages, nuts separate, 60-10 off; bulk 74 off on 15,000 of 3-in. and shorter, or 5000 over 3-in., nuts separate.

Nuts

Semifinished hexagon	A.S. Light	A. S. Reg. and Heavy
7/16-in. and smaller	51 off	....
½-in. and smaller	....	48 off
½-in.-1-in.	48 off	....
⅝-in.-1-in.	....	47 off
1⅛-in.-1½-in.	46 off	45 off
1⅝-in. and larger	....	44 off

Additional discount of 15 for full containers.

Hexagon Cap Screws

Upset 1-in., smaller (10-20 bright)	56 off
Upset (10-35 heat treated)	
⅝ x 6	51 off
¾, ⅞ & 1 x 6	47 off

Square Head Set Screws

Upset 1-in. and smaller	61 off
Headless, ¼-in. and larger	46 off
No. 10 and smaller	56 off

Rivets

Fob Pittsburgh, Cleveland, Chicago Birmingham, Lebanon, Pa.

Structural	5.25c
7/16-inch and under	55-5 off

Washers, Wrought

Fob Pittsburgh, Chicago, Philadelphia, to jobbers and large nut and bolt manufacturers, lcl ..... $1.50-$2.00 off

Tool Steels

Tool Steel: Pittsburgh, Bethlehem, Syracuse, Canton, O., Dunkirk, N. Y., base, cents per lb; reg. carbon 15.15c; extra carbon 19.48c; special carbon 23.80c; oil-hardening 25.97c; high carbon-chromium 46.53c.

W	Cr	V	Mo	Base, per lb
18.00	4	1	...	72.49c
1.5	4	1	8.5	58.43c
....	4	2	3	58.43c
6.40	4.15	1.90	5	62.22c
5.50	4.50	4	4.50	75.74c

Stainless Steels

Base, Cents per lb

Grade	Bars, Drawn Wire, Structurals	Plates	Sheets	Hot Rolled Strip	Cold Rolled Strip
CHROMIUM NICKEL STEELS					
301	26.00c	29.50c	37.00c	22.00c	28.00c
302	26.00	29.50	37.00	23.50	30.50
303	28.50	31.50	39.00	29.50	36.00
304	27.50	31.50	39.00	25.50	32.50
308	31.50	37.00	44.50	31.00	38.00
309	39.00	43.50	51.00	40.50	51.00
310	53.50	56.50	57.50	53.00	61.00
316	43.50	48.00	52.00	43.50	52.00
321	31.50	37.00	44.50	32.00	41.50
347	36.00	41.50	49.00	36.00	45.50
431	21.00	24.00	31.50	19.00	24.50
440A	26.00	31.00	36.50	26.00	30.50
STRAIGHT CHROMIUM STEEL					
403	23.50	27.00	32.00	23.00	29.50
410	20.50	23.50	29.00	18.50	24.00
416	21.00	24.00	29.50	20.00	25.50
420	26.00	31.00	36.50	26.00	33.50
430	21.00	24.00	31.50	19.00	24.50
430F	21.50	24.50	32.00	20.50	27.00
442	24.50	28.00	35.50	26.00	35.00
443	24.50	28.00	35.50	26.00	35.00
446	30.00	33.00	39.50	38.00	56.50
*501	9.00	13.00	17.50	13.00	18.50
*502	10.00	14.50	18.50	14.50	19.50
†STAINLESS CLAD STEEL (20%)					
304	....	24.00	22.00	....	....
410	....	22.00	20.00	....	....
430	....	22.50	20.50	....	....
446	....	29.00	27.00	....	....

* Low chromium. † Fob Pittsburgh and Washington, Pa.; plate prices include annealing and pickling.

Metallurgical Coke

Price Per Net Ton
Beehive Ovens

Connellsville, furnace	*$8.75-$9.00
Connellsville, foundry	9.75-10.00
New River, foundry	11.75
Wise county, foundry	9.00- 9.50
Wise county, furnace	8.50- 9.00

* Operators of hand-drawn ovens using trucked coal, $9.35-$9.60.

Coke By-Products

Spot, gal. freight allowed east of Omaha

Pure and 90% benzol	17.00c
Toluol, two degree	22.00c
Industrial xylol	22.00c
Solvent naphtha	26.00c
Per pound fob works	
Phenol (car lots, returnable drums)	11.25c
Do., less than carlots	12.00c
Do., tank cars	10.25c
Eastern plants, per pound	
Naphthalene flakes, balls, bbl, to jobbers, "household use"	9.50c
Per ton, bulk, fob plants	
Sulphate of ammonia	$30.00

PIG IRON

Prices per gross ton. Minimum delivered prices do not include 3 per cent federal tax.

	No. 2 Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$31.50	$31.00	$32.50	$32.00
Newark, N. J., del.	33.34	32.84	34.34	35.54
Brooklyn, N. Y., del.	34.50	....	....	35.00
Birdsboro, Pa., base	34.00	34.00	35.50	35.00
Birmingham, base	26.88	25.50	31.50	....
Baltimore, del.	33.28	....	....	....
Boston, del.	*31.62	....	....	....
Chicago, del.	*30.72	....	....	....
Cincinnati, del.	31.75	30.37	....	....
Newark, N. J., del.	32.96	....	....	....
Philadelphia, del.	32.13	31.63	....	....
St. Louis, del.	*30.62	*31.54	....	....
Buffalo, base	30.50	30.00	31.50	31.00
Boston, del.	36.98	36.48	37.98	37.48
Rochester, del.	32.34	31.84	33.34	32.84
Syracuse, del.	33.00	32.50	34.00	33.50
Chicago, base	30.50	30.00	31.00	30.50
Milwaukee, del.	31.82	31.32	32.32	31.82
Muskegon, Mich., del.	34.33	....	....	34.33
Cleveland, fob furnace	30.50	30.00	31.00	30.50
Akron, Canton, del.	32.17	31.67	32.67	32.17
Detroit, base	30.50	30.00	31.00	30.50
Saginaw, Mich., del.	33.67	33.17	34.17	33.67
Duluth, base	31.00	30.50	31.50	31.00
Erie, Pa., base	30.50	30.00	31.50	31.00
Everett, Mass., base	29.50	29.00	30.50	30.00
Boston, del.	30.00	29.50	31.00	30.50
Granite City, Ill., base	30.50	30.00	31.00	30.50
St. Louis, del.	31.25	30.75	....	31.25
Neville Island, Pa., base	30.50	30.00	31.00	30.50
†Pittsburgh, del., N.&S. sides	31.33	30.83	31.83	31.33
Provo, Utah, base	30.50	30.00	....	....
Sharpsville, Pa., base	30.50	30.00	31.00	30.50
Steelton, Pa., base	31.50	31.00	32.50	32.00
Swedeland, Pa., base	31.50	31.00	32.50	32.00
Philadelphia, del.	32.51	32.01	....	33.01
Toledo, O., base	30.50	30.00	34.50	34.00
Cincinnati, del.	34.00	33.50	....	....
Youngstown, O., base	30.50	30.00	31.00	30.50
Mansfield, O., del.	33.48	32.98	33.98	33.48

* Plus Jan 1 freight rate increase.

† To Neville Island base add: 66c for McKees Rocks, Pa.; $1.01 Lawrenceville, Homestead, McKeesport, Ambridge, Monaco, Aliquippa; 97c (water), Monongahela; $1.33, Oakmont, Verona; $1.49 Brackenridge.

Exceptions to above prices: Kaiser-Frazer Parts Corp., Struthers, O., charges 50 cents a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable pig iron.

High Silicon Silvery

6.00-6.50 per cent (base).....$38.00
6.51-7.00..$39.00 9.01- 9.50. 44.00
7.01-7.50.. 40.00 9.51-10.00. 45.00
7.51-8.00.. 41.00 10.01-10.50. 46.00
8.01-8.50.. 42.00 10.51-11.00. 47.00
8.51-9.00.. 43.00 11.01-11.50. 48.00

Fob Jackson, O., per gross ton. Buffalo base $1.25 higher. Buyer may use whichever base is more favorable.

Electric Furnace Ferrosilicon: Si 14.01-14.50%, $52.75, Jackson, O.; $56 Keokuk, Iowa; $54, Buffalo and Niagara Falls, N. Y. Add $1 a ton for each additional 0.5% Si to 18%; 50c for each 0.5% Mn over 1%; $1 a ton for 0.045% max. phos.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton.

Charcoal Pig Iron

Semi-cold blast, low phosphorus. Fob furnace, Lyles, Tenn. $37.50 (For higher silicon irons a differential over and above the price of base grade is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Gray Forge

Neville Island, Pa. $30.00

Low Phosphorus

Steelton, Pa., Buffalo, Troy, N. Y., $36. base; Birdsboro, Pa., $39, base; Philadelphia, $38.16, del. Intermediate phosphorus, Central furnace, Cleveland, $33.

Differentials

Basing point prices are subject to following differentials:

Silicon: An additional charge not to exceed 50 cents a ton for each 0.25 per cent silicon in excess of base grade (1.75% to 2.25%).

Phosphorus: A reduction of 38 cents a ton for phosphorus content of 0.70 per cent and over.

Manganese: An additional charge not to exceed 50 cents a ton for each 0.50 per cent, or portion thereof, manganese in excess of 1%.

Nickel: An additional charge for nickel content as follows: Under 0.50%, no extra; 0.50% to 0.74%, inclusive, $2 a ton; for each additional 0.25% nickel, $1 a ton.

Refractories

Per 1000, fob shipping point Net Prices

Fire Clay Brick

Super Duty

Pa., Mo., Ky. $81.0

High Heat Duty

Pa., Ill., Md., Mo., Ky. 65.0
Ala., Ga. 65.0
N. J. 70.0

Intermediate Heat Duty

Ohio 57.0
Pa., Ill., Md., Mo., Ky. 59.0
Ala., Ga. 51.0
N. J. 62.0

Low Heat Duty

Pa., Md., Ohio 51.0

Malleable Bung Brick

All bases 75.0

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry Press 42.0
Wire Cut 40.0

Silica Brick

Pennsylvania 65.0
Joliet, E. Chicago 74.0
Birmingham, Ala. 65.0

Magnesite

Domestic dead-burned grains, net ton, fob Chewelah, Wash.
Bulk 22.0
Bags 28.0

Basic Brick

Net ton, fob Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick 54.0
Chem. bonded chrome 54.0
Magnesite brick 76.0
Chem. bonded magnesite..... 65.0

ORES

Lake Superior Iron Ore

Gross ton, 51½% (Natural) Lower Lake Ports

Old range bessemer..... $5.95
Old range nonbessemer..... 5.80
Mesabi bessemer 5.70
Mesabi nonbessemer..... 5.55
High phosphorus 5.55

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56-63% contract 13.00

Foreign Ore

Cents per unit, cif Atlantic ports

Manganiferrous ore, 45-55% Fe., 6-10% Mn.. Nom.
N. African low phos.. Nom.
Swedish basic, 60 to 68% 13.00
Spanish, No. African basic, 50 to 60%..... Nom.
Brazil iron ore, 68-69% fob Rio de Janeiro... 7.50–8.00

Tungsten Ore

Chinese Wolframite, per short ton unit, duty paid $24.00

Chrome Ore

Gross ton fob cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Oreg., or Tacoma, Wash.
(S S paying for discharge; dry basis, subject to penalties if guarantees are not met.)

Indian and African

48% 2.8:1 ..... $37.50
48% 3:1 ..... 39.00
48% no ratio 31.00

South African (Transvaal)

44% no ratio.....$27-$27.50
45% no ratio..... 28.00
48% no ratio..... 30.00
50% no ratio..... 31.00

Brazilian—nominal

44% 2.5:1 lump..... $33.65
48% 3:1 lump 43.50

Rhodesian

45% no ratio.....$27-$27.50
48% no ratio..... 30.00
48% 3:1 lump..... 39.00

Domestic (seller's nearest rail)

48% 3:1 ..... $39.00

Manganese Ore

Sales prices of Office of Metals Reserve, cents per gross ton unit, dry, 48%, at New York, Philadelphia, Baltimore, Norfolk, Mobile and New Orleans, 85c; Fontana, Calif., Provo, Utah, and Pueblo, Colo., 91c; prices include duty on imported ore and are subject to established premiums, penalties and other provisions. Price at basing points which are also points of discharge of imported manganese ore is fob cars, shipside, a dock most favorable to the buyer. Outside shipments direct to consumers at 15c per unit less than Metals Reserve prices.

Molybdenum

Sulphide conc., lb., Mo. cont., mines $0.7

Fluorspar

Metallurgical grade, fob shipping point in Ill., Ky., net tons, carload, effective CaF_2 content, 70% or more $33; 65% to 70%, $32; 60% to 65% $31; less than 60%, $30.

HIGH-STRENGTH—LOW-ALLOY STEELS

Prices in dollars per 100 pounds.

	Pittsburgh	Chicago	Gary	Youngstown	Sparrows Point	Buffalo	Bethlehem	Canton	Massillon
Sheets, Hot-Rolled	3.75–3.85	3.75–3.85	3.75–3.85	3.85	3.85	3.75–3.85	...	...	...
Cold-Rolled	4.55–4.75	4.55–4.75	4.55–4.75	4.75	...	4.55–4.75	...	...	...
Galvanized	5.40	.....	.....	...	...	.....	...	...	...
Strip, Hot-Rolled	3.75–3.85	3.75–3.85	3.75–3.85	3.85	...	.....	...	...	...
Cold-Rolled	4.55	4.65	4.65	4.65	...	.....	...	...	...
Shapes, Structural	3.85	3.85	.....	3.85	...	.....	3.85	...	...
Plates	4.10	4.10	4.10	...	4.10	.....	...	...	...
Bars and Bar Shapes	4.00	4.00	4.00	4.00	...	4.00	4.00	4.00	4.00

Note: Lower level of quoted ranges represent prices for NAX, produced by Great Lakes Steel Corp., Detro

WAREHOUSE STEEL PRICES

Base prices, cents per pound, for delivery within switching limits, subject to extras

	SHEETS					STRIP		BARS				PLATES	
	H-R 10G	C-R 10G	C-R 17G	Gal. °10G	Gal. °24G	†H-R	C-R	H-R	C-F	H-R Alloy (‡4140)	Structural Shapes	Carbon ¼"-¾"	Floor ⅝" & Thicker
Boston (city)	4.50	....	5.22[4]	6.80[4]	6.80[4]	4.65	6.36	4.62	5.47	7.12	4.47	4.80	6.42
Boston (country)	3.90	....	4.60[4]	....	6.20[4]	3.95	....	4.00	4.85	6.50[11]	3.95	4.20	5.65
Norfolk, Va.	4.35	....	....	....	....	....	....	4.75	5.50	....	4.50	4.50	6.25
New York (city)	4.42	....	5.27[5]	5.47[5]	....	4.62	....	4.62	5.42	8.42[9]	4.37	4.64	6.35
New York (country)	4.32	....	5.17[5]	5.37[5]	....	4.52	....	4.52	4.85	....	4.27	4.54	6.25
Baltimore (city)	4.09	....	5.65[3]	....	6.39[5]	4.40	....	4.45	5.35	....	4.34	4.39	5.90
Baltimore (country)	3.59	....	5.55[2]	....	....	....	....	....	4.85	....	4.24	4.29	5.80
Buffalo (city)	4.00	....	4.70[6]	4.35[6]	....	4.30	4.95	4.05	4.95	....	4.05	4.60	5.90
Buffalo (country)	3.90	....	4.60[6]	4.95[5]	....	3.90	4.60	3.95	4.85	6.60	3.95	4.20	5.45
Philadelphia (city)	4.24	5.73	5.33[9]	....	6.54[5]	4.43	5.28	4.48	5.38	6.87	4.22	4.40	5.93
Philadelphia (country)	4.14	5.63	5.23[9]	....	6.44[5]	4.33	5.18	4.38	4.85	6.60	4.12	4.30	5.83
Pittsburgh (city)	4.00	5.15	4.70[8]	5.05	6.30[8]	4.00	4.95	4.05	4.95	6.60	4.05	4.30	5.55
Pittsburgh (country)	3.90	5.05	4.60[8]	4.95	6.20[8]	3.90	4.85	3.95	4.85	6.60	3.95	4.20	5.45
Cleveland (city)	4.00	5.15	4.70[8]	5.238[5]	6.488[5]	4.188	....	4.05	4.95	6.858	4.311	4.30	5.811
Cleveland (country)	3.90	5.05	4.60[8]	....	....	....	....	3.95	4.85	....	....	4.20	....
Cincinnati	4.116	5.266[8]	....	5.166[5]	....	4.394	....	4.403	5.303	....	4.444	4.653	5.944
Chicago (city)	4.00	....	4.70[8]	....	6.30[8]	4.00	....	4.05	4.95	6.60	4.05	4.30	5.70
Chicago (country)	3.90	....	4.60[8]	....	6.20[8]	3.90	....	3.95	4.85	6.60	3.95	4.20	5.60
Milwaukee	5.99	...	6.69[8]	...	8.29[5]	5.99	....	6.04	6.94	8.59	6.04	6.29	7.69
Indianapolis	4.04	...	4.84[11]	5.29	6.54	4.24	....	4.36††	5.26[12]	11.01	4.36	4.61	6.01
St. Paul	4.384[1]	5.534[8]	5.084[8]	5.434[5]	6.684[5]	4.404[13]	....	4.434[13]	5.726[11]	7.084[11]	4.434[13]	4.684[13]	6.084[11]
St. Louis	4.199	....	4.899[9]	....	6.674[5]	4.199	....	4.249	5.324	7.074	3.999	3.999	5.999
New Orleans	4.46°°	....	5.77[8]	....	....	4.83	....	4.78°°	6.14	....	....	....	....
Houston, Tex.	4.50[1]	....	....	6.00[10]	....	....	....	4.75[1]	....	....	....	....	....
Oklahoma, Nebr.	4.868	6.118[8]	....	5.918[5]	7.168[5]	4.862	....	4.918	5.818[11]	....	4.918	5.168	6.568
Omaha, Nebr.	4.868	6.118[8]	....	5.918[5]	7.168[5]	4.862	....	4.918	5.818[11]	....	4.918	5.168	6.568
San Francisco	4.90	....	6.30[5]	....	7.35[5]	5.20[14]	8.35[15]	4.75[14]	°°°	9.35[16]	4.90[14]	5.00[14]	6.80[14]
Tacoma, Wash.	...	...	...	7.30[5]	...	5.20[17]	....	4.90[17]	6.75[2]	8.95[2]	4.95[17]	5.25[17]	7.25[17]
Seattle	...	...	...	7.30[5]	...	5.20[17]	....	4.90[17]	6.75[2]	8.95[2]	4.95[17]	5.25[17]	7.25[17]

Base Quantities: 400 to 1999 pounds except as noted: Cold-rolled strip, 2000 to 39,999 pounds; cold finished bars, 1000 pounds and over; [1]—any antity; [2]—300 to 1999 pounds; [3]—150 to 2249 pounds; [4]—three to 24 bundles; [5]—450 to 1499 pounds; [6]—one bundle to 1499 pounds; [7]—one to ne bundles; [8]—400 to 1499 pounds; [9]—1000 to 1999 pounds; [10]—450 to 39,999 pounds; [11]—1000 to 39,999 pounds; [12]—1000 pounds and over; —400 to14,999 pounds; [14]—400 to 39,999; [15]—2000 lb and over; [16]—1000 to 49,999; [17]—300 to 9999 pounds.

° Includes gage and coating extra; † does not include gage extras; ‡ basing point cities with quotations representing mill prices plus warehouse read; § as rolled, except New York, Jersey City and Indianapolis where price represents annealed bars; °° add 0.46 for sizes not rolled in Birmingm; †† same prices quoted for Jersey City, N. J.; ‡‡ add 15c for 100 lb for slow moving items; §§ 18 gage and heavier; °°°r ounds under ⅜ in. 7.00c, in. and over 6.50c, squares, hexagons and flats 6 in. and narrower 7.50c, flats over 6 in. 8.25c.

Open Market Prices of Leading Ferroalloy Products

Spiegeleisen: 19-21% carlot per ross ton, Palmerton, Pa., $40; ittsburgh, $40.50; Chicago, $40.60.

Ferromanganese, standard: 78-82% l. gross ton, duty paid, $135 fob rs, Baltimore, Philadelphia or ew York, whichever is most favorble to buyer, Birmingham, Ala. where Sloss-Sheffield Steel & Iron o. is producer); $140 fob cars, ittsburgh, including 50c switching harge, (where Carnegie-Illinois teel Corp. is producer); add $8 for acked c.l., $10 for ton, $13.50 for ss ton; $1.70 for each 1%, or raction contained manganese over 2% or under 78%.

Ferromanganese, low carbon: Eastrn zone: Special, 21c; regular, 0.50c; medium, 14.50c; central one: special, 21.30c; regular, 0.80c; medium, 14.80c; western one: Special, 21.70c; regular, 1.20c; medium, 15.20c. Prices are er pound contained Mn, bulk carlot hipments, fob shipping point, reight allowed. Special low-carbon as content of 90% Mn, 0.10% C, nd 0.06% P.

Ferromanganese Briquets: (Weight pprox. 3 lb and containing exactly lb Mn) Prices per lb of briquets: ontract, carlots, bulk 6.40c, packed 90c, tons 7.30c, less 7.70c, eastern, reight allowed; 6.65c, 7.15c, 7.90c nd 8.30c, central; 7.20c, 7.70c, 80c and 10.20c, western; spot up 25c; notched up 0.25c.

Ferrotungsten: Spot, 10,000 lb or ore, per lb contained W, $1.90; ontract, $1.88; freight allowed as ar west as St. Louis.

Ferrotitanium: 40-45%, R.R. freight llowed, per lb contained Ti; ton ots $1.23; less-ton lots $1.25; eastrn. Spot up 5c per lb.

Ferrotitanium: 20-25%, 0.10 maxium C; per lb contained Ti; ton lots $1.35; less-ton lots $1.40 eastern. Spot up 5c per lb.

Ferrotitanium, High-Carbon: 15-20% contract basis, per net ton, fob Niagara Falls, N. Y., freight allowed to destination east of Mississippi river and north of Baltimore and St. Louis, 6.8% C $142.50; 3-5% C $157.50.

Ferrovanadium: V 35-55%, contract basis, per lb contained V, fob producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Ferromolybdenum: 55-75% per lb, contained Mo, fob Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% P content with unitage of $3 for each 1% of P above or below the base; gross tons per carload fob sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Contract, lump, packed; eastern zone quotations: 90-95% c.l. 12.95c, ton lots 13.45c, smaller lots 13.95c; 80-90% c.l. 11.35c, ton lots 11.90c, smaller lots 12.45c; 75%, c.l. 10.15c, ton lots 10.75c, smaller lots 11.35c; 50% c.l. 8.45c, ton lots 9.10c, smaller lots 9.75c. Deduct 1.0c for bulk carlots 75%, 80-90%, 90-95%. Prices are fob shipping point, freight allowed, per lb of contained Si. Spot prices 0.25c higher on 80-90%, 0.30c on 75%, 0.45c on 50%.

Ferroboron: (B 17.50% max. and C 1.50% max., Al 0.50% max. and C 0.50% max.) Prices per lb of alloy, contract, ton lots $1.20, less ton lots $1.30, eastern, freight allowed; $1.2075 and $1.3075 central; $1.229 and $1.329, western; spot add 5c.

Ferrocolumbium: 50-60%, per lb contained columbium in gross ton lots, contract basis, R. R. freight allowed, eastern zone, $2.50; less ton lots $2.55. Spot up 10c.

Ferrochrome: Contract, lump, packed; **high carbon,** eastern zone, c.l. 16.20c, ton lots 16.80c; central zone, add 0.40c and 1.30c; western zone, add 0.55c and 2.10c. Deduct 0.60c for bulk carlots.

High carbon, high nitrogen, add 5c to all high carbon ferrochrome prices. Deduct 0.55c for bulk carlots. Spot prices up 0.25c.

Low carbon, eastern zone, bulk, c.l., max. 0.06% C 23c; 0.1% 22.50c, 0.15% 22c, 0.2% 21.50c, 0.5% 21c, 1% 20.50c, 2% 19.50c; add 1c for 2000 lb to c.l.; central zone, add 0.4c for bulk, c.l., and 0.65c for 2000 lb to c.l.; western zone, add 0.5c for bulk, c.l., and 1.85c for 2000 lb to c.l.; carload packed differential 0.45c. Prices are per pound of contained Cr, fob shipping points.

Low carbon, high nitrogen: Add 2c to low carbon ferrochrome prices. For higher nitrogen low carbon, add 2c for each 0.25% of nitrogen over 0.75%.

Ferrochrome, Special Foundry: (Cr 62-66%, C above 5-7%.) Contract, 2-inch x D, packed, eastern zone, freight allowed, c.l. 17.05c, ton lots 17.60c, less than ton 18.30c; central zone, add 0.40c for c.l. and 1.30c for smaller lots; western zone, add 0.55c for c.l. and 2.10c for smaller lots. Deduct 0.60c for bulk carlots.

S. M. Ferrochrome, high carbon: (Cr 60-65%, Si, Mn and C 4-6% each.) Contract, lump, packed, eastern zone, freight allowed, c.l. 17.30c, ton lots 17.90c, less than ton 18.60c; central zone, add 0.40c for c.l. and 1.30c for smaller lots; western zone, add 0.55c for c.l. and 2.10c for smaller lots. Prices are per pound of contained chromium, spot prices 0.25c higher. Deduct 0.60c for bulk carlots.

S. M. Ferrochrome, low carbon: (Cr 62-66%, Si 4-6%, Mn 4-6% and C 1.25% max.) Contract, carlot, bulk 20.00c, packed 20.15c; ton lots 21.00c, less ton lots 22.00c, eastern, freight allowed, per pound contained Cr; 20.40c, 20.50c, 20.95c and 22.65c, central; 21.00c, 21.45c, 22.85c and 23.85c, western; spot up 0.25c.

Ferrochrome Briquets: Containing exactly 2 lb Cr, packed eastern zone, c.l. 10.35c, ton lots 10.75c, less than ton 11.15c; central zone, add 0.25c for c.l. and 0.90c for smaller lots; western zone, add 0.55c for c.l. and 2.10c for smaller lots. Deduct 0.50c for bulk carlots. Prices per pound of briquets; spot prices 0.25c higher; notched, 0.25c higher.

Chromium Metal: 97% min. Cr, max. 0.50% C, eastern zone, per lb contained Cr bulk, c.l. 79.50c, 2000 lb to c.l. 80c; central 81c and 82.60c; western 82.25c and 84.75c, fob shipping point, freight allowed.

Chromium-Copper: (Cr 8-11%, Cu 88-90%, Fe 1% max., Si 0.50% max.) Contract, any quantity, 45c, eastern, Niagara Falls, N. Y., basis, freight allowed to destination, except to points taking rate in excess of St. Louis rate to which equivalent of St. Louis rate will be allowed; spot up 2c.

Calcium metal; cast: Contract, ton lot or more, $1.60; 100 to 1999 lb, $1.95; less than 100 lb, $3.15 per lb of metal, eastern zone; $1.615, $1.965 and $3.185, western; spot up 5c.

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%), per lb of alloy. Contract, carlots, 15.50c, ton lots 16.50c and less 17.00c, eastern, freight allowed; 16.00c, 17.35c, and 17.85c, central; 18.05c, 19.10c and 19.60c western; spot up 0.25c.

Calcium - Silicon: (Ca 30-35%, Si

60-65% and Fe 3.00% max.), per lb of alloy. Contract, carlot, lump 13.00c, ton lots 14.50c, less 15.50c, eastern, freight allowed; 13.50c, 15.25c and 16.25c central; 15.55c, 17.40c and 18.40c, western; spot up 0.25c.

Silicon Metal: Min. 97% Si and max. 1% Fe, eastern zone, bulk, c.l. 13.65c; 2000 lb to c.l., 15.05c; central zone, 14.25c and 17.30c; western; 14.85c and 19.05c; min. 96% Si and max. 2% Fe, eastern, bulk, c.l. 13.15c, 2000 lb to c.l. 14.65c; central, 13.85c and 16.90c; western, 14.45c and 18.65c, fob shipping point, freight allowed. Price per lb contained Si.

Silicomanganese, containing exactly 2 lb Mn and about ½ lb Si eastern zone, bulk, c.l. 6.15c, ton lots 7.05c; central zone, add 0.25c for c.l. and 0.60c for ton lots; western, add 0.80c for c.l. and 2.50c for ton lots. Notched, up 0.25c.

Ferrosilicon: Weighing about 5 lb and containing exactly 2 lb Si, packed, eastern zone, c.l. 4.20c, ton lots 4.60c, less than ton lots 5c; weighing about 2½ lb and containing 1 lb Si, packed, eastern zone, c.l. 4.35c, ton lots 4.75c, less 5.15c; notched 0.25c higher; central zone, add 0.25c for c.l. and 0.60c for smaller lots; western zone, add 0.45c for c.l. and 0.90c for smaller lots. Prices are fob shipping point, freight allowed; spot prices 0.25c higher. Deduct 0.50c for bulk carlots.

Manganese Metal: (Min. 96% Mn, max. 2% Fe), per lb of metal, eastern zone, bulk, c.l. 30c, 2000 lb to c.l., 32.00c; central 31.00c and 33.45c; western, 31.45c and 34.40c.

Electrolytic Manganese: 99.9% plus, fob Knoxville, Tenn., freight allowed east of Mississippi on 250 lb or more: Carlots 32c, ton lots 34c, drum lots 36c, less than drum lot 38c. Add 1½c for hydrogen-removed metal.

Manganese-Boron: (Mn 75% approx., B 15-20%, Fe 5% max., Si 1.50% max. and C 3% max.) Prices per lb of alloy. Contract, ton lots $1.89, less $2.01, eastern, freight allowed; $1.903 and $2.023, central; $1.935 and $2.055, western; spot up 5c.

Nickel-Boron: (B 15-18%, Al 1% max., Si 1.50% max., C 0.50% max., Fe 3% max., Ni, balance). Prices per lb of alloy, Contract, 5 tons or more $1.90, 1 ton to 8 tons $2.00, less than ton $2.10, eastern, freight allowed; $1.9125, $2.0125 and $2.1125, central; $1.9445, $2.0445 and $2.1445, western; spot same as contract.

Borosil: 3 to 4% B, 40 to 45% Si; $6.25 per lb contained B, fob Philo, O., freight not exceeding St. Louis rate allowed.

Bortam: B 1.5-1.9%, ton lots, 45c per lb; less-ton lots, 50c per lb.

Carbortam: B 0.90 to 1.15% net ton to carload, 8c per lb, fob Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

Silicaz Alloy: (Si 35-40%, Ca 9-11%, Al 5-7%, Zr 5-7%, Ti 9-11% and B 0.55-0.75%) Prices per lb of alloy, contract, or spot carlots 35.00c, ton lots 37.00c, less 39.00c, eastern, freight allowed; 35.30c, 38.10c and 40.10c, central; 35.30c, 40.05c and 42.05c, western; spot up 0.25c.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7% and Fe approx. 20%) Prices per lb of alloy, contract, carlots 12.50c, ton lots 13.25c, less 14.00c, eastern zone, freight allowed; 12.80c, 14.35c and 15.10c, central; 12.80c, 16.30c and 17.05c, western; spot up 0.25c.

CMSZ Alloy 4: (Cr 45-49%, Mn 4-6%, Si 18-21%, Zr 1.25-1.75% and C 3.00-4.50%). Contract or spot, carlots, bulk 12.00c, packed 12.75c; ton lots 13.50c, less 14.25c, eastern zone, freight allowed; 12.30c, 13.05c, 14.60c, 15.35c, central; 12.30c, 13.05c, 16.65c, 17.30c, western.

CMSZ Alloy 5: (Cr 50-56%, Mn 4-6%, Si 13.50-16.00%, Zr 0.75-1.25%, C 3.50-5.00%) Prices per lb of alloy, contract or spot, carlots, bulk 11.75c, packed 12.50c, ton lots 13.25c, less 14.00c, eastern, freight allowed; 12.05c, 12.80c, 16.30c 17.05c, western.

Zirconium Alloy: 12-15%, per of alloy, eastern, contract, carlots bulk 4.85c, packed 5.30c, ton lot 5.65c, less 6.00c; spot up 0.25c.

Zirconium Alloy: Zr 35-40%, eastern contract basis, carloads in bulk package, per lb of alloy 14.50c, to lots 15.75c, less 17.00c; spot 0.25c.

Alsifer: (Approx. 20% Al, 40% 40% Fe) Contract basis fob Niaga Falls, N. Y., lump per lb 6.25c; to lots 6.75c; less 7.25c. Spot up ½

Simanal: (Approx. 20% each Si, M Al) Packed, lump, carload 9c, t lots 9.25c, less-ton lots 9.75c per alloy; freight not exceeding St Louis rate allowed.

Tungsten Metal Powder: Spot, n less than 97%, $2.50-$2.60; freig allowed as far west as St. Louis.

Grainal: Vanadium Grainal No. 87.5c; No. 6, 60c; No. 79, 45c; fob Bridgeville, Pa., usual freig allowance.

Vanadium Pentoxide, technic grade: Fused, approx. 89-92% V and 5.84% NA_2O; or air dried, 85% V_2O_5 and 5 15% NA_2O, $1 per lb contained V_2O_5 fob pl freight allowed on quantities of lb and over to St. Louis.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Prices are dollars per gross ton, including broker's commission, delivered at consumer's plant except where noted.

OPEN HEARTH AND BLAST FURNACE GRADES

	—Heavy Melting—		No. 1	—Bundles—			Machine Shop	Mixed Borings,	Short Shovel	Cast Ir
	No. 1	No. 2	Busheling	No. 1	No. 2	No. 3	Turnings	Turnings	Turnings	Borin
Pittsburgh	32.50	32.50	32.50	32.50	32.50	32.50	27.50–28.00	27.50–28.00	29.00–29.50	28.50–29.
Philadelphia	31.50	31.50	31.50	31.50	31.50	29.50	24.00	24.00	24.00	24.
Chicago	30.00	30.00	30.00	30.00	30.00	28.00	25.00	25.00	27.00	26.
Cleveland	30.00–32.50	30.00–32.50	30.00–32.50	30.00–32.50	30.00–32.50	28.00–30.50	24.00–24.50	25.00–25.50	25.00–25.50	25.00–25.
Cincinnati	29.50	29.50	28.50	29.50	29.00	....	22.50	21.00	24.00	22.
•Boston	25.00–26.00	25.00–26.00	25.00–26.00	25.00–26.00	25.00–26.00	23.00–24.00	19.00–20.50	17.35–17.85	21.00–22.50	17.
†New York	30.00	30.00	30.00	30.00	30.00	28.00	21.50–22.00	21.50–22.00	23.50–24.00	..
Buffalo	32.00–34.00	30.00–32.00	30.00–32.00	30.00–32.00	30.00–32.00	28.00	19.50	19.50	22.00	20.
†Detroit	27.00–27.50	....	27.00–27.50	27.00–27.50	27.00–27.50	25.00–25.50	20.00–20.50	20.00–20.50	22.00–22.50	22.00–22
Valley	32.50	32.50	....	32.50	....	....	26.50–27.00	..	27.50–28.00	27.50–28.
Mansfield	....	....	....	....	....	....	26.00	....	28.00	.
St. Louis	28.25–28.75	28.75	....	....	....	....	23.25–23.75	....	23.25–23.75	.
Birmingham	22.00–22.50	22.00–22.50	22.00–22.50	22.00–22.50	22.00–22.50	20.00–20.50	14.50–15.00	14.50–15.00	16.50–17.00	15.50–16
San Francisco	19.50	19.50	19.50	19.50	19.50	10.00	8.00	....	....	.
Seattle	19.00	19.00	19.00	19.00	19.00	17.00	11.50	....	....	..
Los Angeles	16.50	15.50	....	14.50	14.50	....	8.00	8.00	....	.

ELECTRIC FURNACE, FOUNDRY AND SPECIAL GRADES

	Bar Crops and Plate	Cast Steel	Punchings and Plate Scrap	Electric Furnace Bundles	Heavy Turnings	Alloy Free Turnings	Cut Structural and Plate Scrap 1 ft and under	Cut Structural and Plate Scrap 2 ft and under	No. 1 Chemical Borings	Tin Bun
Pittsburgh	35.00–36.00	37.00–37.50	37.00–37.50	35.00–36.00	32.00–33.00	29.00–29.50	35.00–36.00	35.00–36.00	32.00–35.00	28.50–29
Philadelphia	35.00–36.00	35.00–36.00	35.00–36.00	35.00	33.00–33.50	....	36.00	36.00	31.50–32.00	.
Chicago	31.50–35.00	31.50–35.00	31.50–35.00	31.50–35.00	28.50–31.00	....	31.50–35.00	31.50–35.00	....	.
Cleveland	35.00	35.00	35.00	32.50	30.00–32.50	27.00	34.50	34.50	27.00	.
•Boston	29.35	29.35–29.85	29.35–29.85	29.35	26.35	25.35	28.85	28.85	25.85	.
†New York	....	....	30.00	30.00–31.00	....	....	30.00	30.00	23.00–24.00	..
Buffalo	....	27.00	30.00–31.00	28.50	22.50	23.00	28.50	28.50	22.75	.
†Detroit	....	....	28.50–30.50	30.50	....	....	....	....	....	.
Birmingham	24.50–25.00	24.50–25.00	24.50–25.00	....	....	....	24.50–25.00	24.50–25.00	....	.
San Francisco	18.00	18.00	....	....	....	8.00	20.50	20.00	....	17
Seattle	....	....	21.50	....	....	....	21.50	21.50	....	.

STEEL GRADES OF RAILROAD ORIGIN

	No. 1 Heavy Melting R.R. Steel	Railroad Malleable	Axles	Rails — Rerolling	Rails — Random Lengths	Rails — Cut 3-ft and under	Rails — Cut 18-in. and under	Railroad Specialties	Uncut Tires	Angl Splice
Pittsburgh	32.50	41.50–42.00	40.00–41.00	38.00–39.00	38.00–39.00	41.50–42.50	42.00–43.00	36.00–37.00	36.00–37.00	38.00–3
Chicago	31.00	....	....	38.00–39.00	37.00–38.00	40.00–41.00	41.00–42.00	36.50	....	37
Cleveland	32.00	45.00	....	35.00–36.00	38.00–39.00	39.00	39.00	30.50	36.50	2
Cincinnati	29.50	35.00	....	36.00	36.00	....	40.00	....	....	
Valley	32.50	....	....	....	....	....	....	....	....	
St. Louis	....	40.00–41.00	....	34.00–37.00	33.00–35.00	37.00–45.00	....	....	29.00–33.00	36.00–3
Birmingham	23.00–23.50	....	....	25.50–26.00	24.00–24.50	26.50–27.00	27.50–28.00	....	....	25.50–2
San Francisco	....	....	26.50	....	21.00	....	....	....	23.00	
Seattle	20.00	27.50	....	....	20.00	....	....	....	....	2

CAST IRON GRADES

	No. 1 Cupola Cast	Charging Box Cast	Heavy Breakable Cast	Stove Plate	Unstripped Motor Blocks	Malleable	Brake Shoes	Clean Auto Cast	No. 1 Wheels	Burnt
Pittsburgh	42.00–43.00	40.00–41.00	35.00–36.00	39.00–40.00	38.00–39.00	41.50–42.00	33.00–34.00	43.00–44.00	40.00–41.00	35.00–3
Philadelphia	44.00–45.00	42.50	42.50	....	41.00	45.00	....	44.00–45.00	43.00	
Chicago	40.00–45.00	....	....	....	....	40.00–45.00	....	35.00–40.00	....	
Cincinnati	40.00	30.00	32.00	28.00	30.00	....	28.00	40.00	....	
•Boston	42.00–44.00	36.00–38.00	35.00–37.00	36.00	....	....	....	38.00–40.00	....	
†New York	39.50–40.00	37.50–38.00	....	....	34.50	40.00–41.00	....	....	....	
Buffalo	35.00–40.00	31.00–35.00	....	33.00–38.00	....	34.00–38.00	....	38.00	32.75–33.25	
†Detroit	35.00–37.00	....	28.00–30.00	....	....	....	....	35.00–37.00	....	
•St. Louis	35.00–37.00	30.00–35.00	30.00–32.00	29.00–34.00	....	....	28.75–31.00	35.00–37.00	34.50–36.50	25.00–3
Birmingham	30.00	....	25.00	28.00	25.00	....	22.75	....	27.00	
Seattle	27.50	22.50	21.50	25.50	21.50	27.50	27.50	27.50	24.00	
Los Angeles	30.00	....	....	....	....	....	....	....	....	

• For shipping point; † fob tracks; ‡ dealers buying prices, fob shipping point; § nominal; •• fob dealers yard.

NONFERROUS METAL PRICES

pper: Electrolytic, carlots 19.50c-20.50c, del. nn.; Lake, 19.62½c, del. Conn. Dealers may ¾c for 5000 lb to carload; 1c, 1000-4999 lb; c, 500-999 lb; 2c, 0-499 lb. Casting, 19.25c, inery, 20,000 lb or more; 19.50c, less than 000 lb.

ass Ingot: 85-5-5-5 (No. 115) 20.50c; 88-10-2 o. 215) 24.75c; 80-10-10 (No. 305) 23.50c; 1 yellow (No. 405) 16.25c; carlot prices, luding 25c per 100 lb freight allowance; add for less than 20 tons.

c: Price western 10.50c, brass special 10.75c, ermediate 11.00c, E. St. Louis; high grade 50c, del., carlots. For 20,000 lb to carlots 1 0.15c; 10,000-20,000 lb 0.25c; 2000-10,000 0.4c; under 2000 lb 0.50c.

ad: Common 12.80-12.85c, chemical 12.90c, roding 12.90c, E. St. Louis for carlots.

imary Aluminum: 99% plus, ingots 15.00c ., pigs 14.00c del.; metallurgical 94% min. 50c del. Base 10,000 lb and over; add ½c 00-9999 lb; 1c less through 2000 lb.

condary Aluminum: Piston alloy (No. 122 pe) 17.00c; No. 12 foundry alloy (No. 2 ade) 16.50c; steel deoxidizing grades, notch rs, granulated or shot: Grade 1 (95-97½%) .00c; grade 2 (92-95%) 16.25c; grade 3 0-92%) 15.75c; grade 4 (85-90%) 15.50c. ove prices for 30,000 lb or more; add ¼c .000-30,000 lb; ½c 5000-10,000 lb; ¾c 1000-00 lb; 1¼c less than 1000 lb. Prices include eight at carload rate up to 75c per 100 lb.

agnesium: Commercially pure (99.8%) stand-d ingots (4-notch, 17 lb) 20.50c per lb, car-s; 22.50c 100 lb to c.l. Extruded 12-in. sticks .00c-38.00c.

n: Prices ex-dock, New York in 5-ton lots. id 1 cent for 2240-11,199 lb, 1½c 1000-2239, ½c 500-999, 3c under 500. Grade A, 99.8% higher (includes Straights), 70.00c; Grade 99.8% or higher, not meeting specifications r Grade A, with 0.05% max. arsenic, .87½c; Grade C, 99.65-99.79% incl. 69.62½c; ade D, 99.50-99.64% incl., 69.50c; Grade 99-99.49% incl. 69.12½c. Grade F, below % (for tin content), 69.00c.

ntimony: American bulk carlots fob Laredo, ex., 99.0% to 99.8% and 99.8% and over but ot meeting specifications below, 28.25c; 99.8% nd over (arsenic, 0.05% max.; other impuri-es, 0.1% max.) 28.75c. On producers' sales id ¼c for less than carload to 10,000 lb; c for 9999-224 lb; and 2c for 223 lb and less; n sales by dealers, distributors and jobbers id ½c, 1c, and 3c, respectively.

ickel: Electrolytic cathodes, 99.9%, base sizes t refinery, unpacked 35c lb; 25 lb pigs produced om electrolytic cathodes 36.50c lb; shot pro-uced from electrolytic cathodes 37.50c lb; F" nickel shots or ingots for additions to cast on 35.50c lb. Prices include import duty.

ercury: Open market, spot, New York, $88-92 per 76-lb flask.

rsenic: Prime, white, 99%, carlots, 4.00c lb.

erryllium-Copper: 3.75-4.25% Be, $14.75 per contained Be.

admium: Bars, ingots, pencils, pigs, plates, ods, slabs, sticks, and all other "regular" raight or flat forms $1.50 lb, del.; anodes, ails, discs and all other special or patented apes, $1.55.

obalt: 97-98%, $1.50 lb for 550 lb (keg); 1.52 lb for 100 lb (case); $1.57 lb under 100 .

old: U. S. Treasury, $35 per ounce.

ndium: 99.9%, $2.25 per troy ounce.

ilver: Open market, N. Y. 70.75c per ounce.

latinum: $58-$61 per ounce.

Palladium: $24 per troy ounce.

Iridium: $110 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass products prices based on 19.50c, Conn., for copper. Freight prepaid on 100 lb or more.)

Sheet: Copper 30.93c; Yellow brass 27.53c; commercial bronze, 95% 31.07c, 90% 30.56c; red brass, 85% 29.53c, 80% 29.02c; best quality 28.44c; Everdur, Duronze, Herculoy or equiv., cold-drawn, 35 79c; nickel silver, 18%, 39.82c; phosphor bronze, grade A, 5%, 48.82c.

Rods: Copper, hot rolled 27.28c, cold drawn 28.28c; yellow brass, free cutting, 22.28¢, not free cutting 27.22c; commercial bronze, 95% 30.76c, 90% 30.25c; red brass, 85% 29.22c, 80% 28.71c; best quality 28.13c.

Seamless Tubing: Copper 30.97c; yellow brass 30.29c; commercial bronze 90% 32.97c; red brass 85% 32.19c, 80% 31.68c; best quality brass 30.85c.

Copper Wire: Bare, soft, fob eastern mills, carlots 25.52c, less carlots 26.02c; weatherproof, fob eastern mills carlot 26.42c, less carlots 26.92c; magnet, delivered, carlots 28.93c, 15,000 lb or more 29.18c, less carlots 29.68c.

Aluminum Sheets and Circles: 2s and 3s flat mill finish, base 30,000 lb or more del.; sheet widths as indicated; circle diameter 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32.90c
19-20	24"-42"	29.80c	35.30c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers: Full sheets 16.25c, 140 sq ft rolls; add per hundredweight, 25c, 80 to 140 sq ft; 50c, 20 to 80 sq ft; 75c, 10 to 20 sq ft.
Pipe: Full coils 15.50c; cut coils 15.75c.
Lead Traps and Bends: List plus 38%.

Zinc Products: Sheet, 15.50c-15.75c, fob mill, 36,000 lb and over. Ribbon zinc in coils, 14.50c-14.75c, fob mill, 36,000 lb and over.

Plating Materials

Chromic Acid: 99.75%, flake, del., carloads, 20.00c; 5 tons and over, 25.00c; 1 to 5 tons, 21.00c; less than 1 ton, 21.50c.

Copper Anodes: In 500-lb lots, fob shipping point, freight allowed, cast oval, over 15 in., 36.87½c; flat untrimmed, 36.87½c; electro-deposited, 30.62½c.

Copper Carbonate: 52-54% metallic Cu, 250 lb barrels, nom.

Copper Cyanide: 70-71% Cu, 100-lb kegs or bbls, 41.50c fob Niagara Falls.

Sodium Cyanide: 96-98%, ½-oz balls, in 100 or 200 lb drums, 1 to 400 lb, 16.00c, 500 lb and over, 15.00c, fob Cleveland; 1 cent less, fob Niagara Falls.

Nickel Anodes: Cast and rolled carbonized, carloads, 48.00c; 10,000 to 30,000 lb, 49.00c; 30,000 to 10,000 lb, 50.00c; 500 to 3000 lb, 51.00c; 100 to 500 lb, 53.00c; under 100 lb, 56.00c; add 1 cent for rolled depolarized.

Nickel Chloride: 100-lb kegs, 22.00c; 275-lb bbls, 22.00c.

Tin Anodes: Bar, 1000 lb and over 82.50c; 500 to 1000 lb, 83.00c; 200 to 500 lb, 83.50c; less than 200 lb, 84.00c; ball, 1000 lb and over, 84.75c; 500 lb to 1000 lb, 85.25c; 200 to 500 lb, 85.75c; less than 200 lb, 86.25c, fob Sewaren, N. J.

Tin Chloride: 400 lb bbls, nom., fob Grasselli, N. J.; 100 lb kegs, nom.

Sodium Stannate: In 100 or 200 lb. drum, 49.00c; 4 to 11 kegs, 47.00c; 12 to 20 kegs, 44.30c; 21 kegs and over, 43.50c; in 350-lb bbl, 46.50c; 4 to 5 bbls, 43.80c; 6 bbls and over, 43.00c; fob Chicago, freight allowed east of Mississippi on 100 lb and over.

Zinc Cyanide: 100-lb drums, 35.00c, fob Cleveland; 34.00c, fob Niagara Falls.

Scrap Metals

BRASS MILL ALLOWANCES

Prices for less than 15,000 lb fob shipping point. Add ¾c for 15,000-40,000 lb; 1c for 40,000 or more.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	17.125	17.125	16.375
Yellow brass	13.750	13.250	12.875
Commercial Bronze			
95%	15.875	15.625	15.125
90%	15.750	15.500	15.000
Red brass			
85%	15.500	15.250	14.750
80%	15.375	15.125	14.625
Best Quality (71-79%)	14.625	14.375	.....
Muntz metal	12.875	12.625	12.125
Nickel silver, 5%	14.500	14.250	7.250
Phos. bronze, A. B.	18.125	17.875	16.875
Naval brass	13.250	13.000	12.500
Manganese bronze	13.250	13.000	12.375

BRASS INGOT MAKERS' BUYING PRICES

(Cents per pound, fob shipping point, carload lots)

No. 1 copper 17.00, No. 2 copper 16.00, light copper 15.00, composition red brass 16.00, auto radiators 13.00, heavy yellow brass 11.50, brass pipe 12.00.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper, 18.75c; No. 2 copper, 17.25c; light copper, 16.25c; refinery brass (60% copper), per dry copper content, 15.00-15.25c.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots or more)

Copper and Brass: Heavy copper and wire, No. 1 15.50-16.00; No. 2 14.50-15.00; light copper 13.50-14.00, No. 1 composition red brass 14.00-14.50, No. 1 composition turnings 13.00-13.50, mixed brass turnings 9.50-10.00, new brass clippings 13.00-13.50, No. 1 brass rod turnings 11.75-12.25, light brass 8.00-8.50, heavy yellow brass 10.00-10.50, new brass rod ends 12.00-12.50, auto radiators, unsweated, 11.00-11.50, clean red car boxes 12.50-13.00, cocks and faucets 11.75-12.00, brass pipe 11.50-11.75.

Lead: Heavy lead 11.25-11.50, battery plates 6.50-6.75, linotype and stereotype 13.50-14.00, electrotype 11.50-12.00, mixed babbitt 12.00-12 50, solder joints 13.50-14.00.

Zinc: Old zinc 5.50-6.00, new die cast scrap 5.50-6.00, old die cast scrap 4.00-4.50.

Tin: No. 1 pewter 44.00-45.00, block tin pipe 60 00-62.00, auto babbitt 35.00-36.00, No. 1 babbitt 35.00-38.00, siphon tops 38.00-40.00.

Aluminum: Clippings, 2S, 9.50-10.00, old sheets 7.50-7.75, crankcases 7.50-8 00, turnings 4.00-4.25, pistons, free of struts, 6.75-7.00.

Nickel: Anodes 19.50-20.50, turnings 16.50-17.50, rod ends 19.00-20.00.

Monel: Clippings 14.00-15.00, turnings 9.00, old sheet 12.00-13.00, rods 12.50-13.00, castings 10.00.

Extras on Carbon Cold-Rolled Strip Steel Revised Upward . . Demand Continues Heavy

(*Concluded from Page 67*)

clusive. These size ranges are now combined.

Widths over 6-in. for thickness 0.161-in. and thicker formerly carried no size extra for "hard" tempered coils; now an extra of $1.15 per 100 pounds is charged over 6 to 12-in. wide inclusive, and $1.05 over 12-in. Size extras for cut lengths 24-in. and longer also have been increased up to $1.15 in heavier gages, and there is one series of extras for width range over 12 to 23⅛ inch.

Extra for bright finish has been advanced from 75 cents to $1.50 per 100 pounds. Procedure for charging extras for special weight coils has been completely revised, with addition of new width ranges.

New packaging, boxing and wrapping extras are established. Packaging extras now apply for quantity ranges 9999 to 6000 pounds per skid; 5999 to 4000; 3999 to 2000; and 1999 to 1000 pounds. Minimum skidding charge is $4 per 100 pounds for bare skids; $5 for shrouded. An extra of 10 cents per 100 pounds is charged for coils in lifts 4000 to 6000 pounds. A boxing extra of 75 cens per 100 pounds is charged for boxes containing 500 pounds or more of a size and kind; $1.25 for 499 to 250 pounds; $2.25 for 249 to 100 pounds; minimum charge is $2.50 per order or item. A wrapping extra of 25 cents is charged for coils papered, single wrapped; 40 cents double wrapped. Interleaved single wrapped the extra is 30 cents; double wrapped, 45 cents. Details on new drawing quality and quantity extras are not yet available on cold-rolled strip.

Gage extras for electrical sheet coils and cut lengths have been increased 5 to 30 cents in gage range from 25 to 30. Gage extra for 25 gage is up 5 cents to 15 cents; gages 26, 27 and 28 advanced 10 cents to 30, 40 and 50 cents, respectively. An increase of 15 cents to 65 cents is established for 29 gage; and 30 cents to 90 cents for 30 gage. The width extras have been brought in line with popular thicknesses, and to correlate with core plating extras so that all thickness ranges are constant. The width and length ranges also are revised in keeping with present day production methods.

Order quantity extra for less than 7000 pounds has been increased from 25 to 50 cents. Formerly, item quantity extras were applicable in ranges under 1500 pounds; these have been increased and revised as follows: 9999 to 6000 pounds, no charge; 5999 to 4000, 20 cents; 3999 to 2000, 50 cents; 1999 to 1000 pounds, $1; under 1000 pounds, $1.50.

Previously there was a flat oiling extra of 10 cents regardless of thickness, now these extras are applicable on lighter gages as follows: 17 gage and heavier, 10 cents; 18 to 21 gage, 15 cents; 22 to 24 gage, 20 cents; 25 to 27 gage, 25 cents; 28 to 30 gage, 30 cents.

Coiling extra of 25 cents heretofore applying for coils under 24 inches wide now apply for all widths.

Pickling before annealing extras for field, armature and electrical grades have been established as follows: 17 gage and heavier, 30 cents; 18 to 21 gage, 40 cents; 22 to 24 gage, 50 cents; 25 to 27 gage, 60 cents; and 28 to 30 gage, 75 cents. An extra of 25 cents is charged for one pass cold roll, after annealing and core loss testing, to surface harden; applicable to armature and electrical grades. An elaborate new schedule of packaging extras also has been established, conforming with those recently announced in hot and cold-rolled sheet extra cards.

Empire Steel Corp. has established price base on field grade electrical sheets at $4.20 per 100 pounds, Pittsburgh. Kokomo, Ind., is reported to have been established as a basing point on field, armature and electrical grades at 10 cents above Pittsburgh price base. The arbitrary Pacific ports and Gulf coast prices on electrical sheets have been discontinued, with prices now based Pittsburgh, plus rail and ocean rate and arbitrary marine insurance, dock handling and switching charges which vary at major ports.

Boston — Without exception metal-working industries consuming narrow cold-rolled strip are clamoring for more tonnage with prospects slim for increased quotas in the second quarter. Users of light gage hot-rolled sheets are confronted with the same stringency. First easing is looked for in 12 gage and heavier sheets, but not before mid-summer. Spot-lighting demand for sheets in this area is the increase in requirements for specialty grades. Electrical, enameling and elecro-galvanized. Overall average advance in electrical sheets is estimated at $10 a ton to consumers. Drawn-out shortage of hot-dipped galvanized sheets has opened markets for electro-galvanized, outdoor billboard structures being one among many. Indications based on prospective hot-rolled schedules are narrow cold-rolled strip supply will be limited through balance of the year with rerolling programs subject to frequent adjustments.

Birmingham — Sheet users continue their pressure for delivery but they are not being met in hoped for quantity. Some users of sheets, especially in areas contingent to the Birmingham district, are said to be faring better generally, but not much improvement in the overall supply is indicated for a while, at least.

Cincinnati—Sheet mills are well into the task of setting the second quarter schedules, preliminary surveys indicating allotments will be greater than in the first quarter. Conditions and developments in the fourth quarter imposed handicaps on mills which are currently being modified or eliminated. Demand shows no sign of relaxing and mills are still refusing delivery positions through the entire year.

Sheets, Strip . . .

Sheet & Strip Prices, Page 172

Chicago—Mills are now noting considerable activity among their customers to alter purchasing practices to minimi higher materials cost imposed upon the recently through the new extras ma effective with the higher base pric Few actual changes have occurred buying practices as yet, but the trend developing and likely will reach ma proportions shortly. One sheet consum has found that the extras and high base price have increased his cost sheets by $50 a ton.

New York—Except for a few misc laneous specialties, prices on sheet pro ucts now have been revised fully. The is still considerable confusion in the tra with respect to certain extras, but this ironing itself out gradually. Meanwhi buyers are still active in revising speci cations wherever possible so as to less the burden of the new extra schedul and in this mills are cooperating fully.

Sheet sellers generally—at least tho selling on a quarterly basis, as the gr majority do—are expected to announ quotas for second quarter of their c tomers within a few days. A couple a already reported to be taking su action.

Some black market material continu to be offered here at prices far abo mill and regular warehouse levels. So spot tonnage of 26-gage galvaniz sheets has been offered here at 25 ce a pound, as compared with a mill pr of 5 cents.

Philadelphia—Sheet sellers genera have not yet announced quotas for s ond quarter, and at least one large p ducer may not before the middle of t month. However, it would not pr surprising if several will take acti this week. Indications are that cus mer quotas will be somewhat heav than in the current quarter, althou far short of requirements. One la mill has indicated that in opening bo for next quarter, it will not accept new tonnage for shipment in April. least one or two producers doubt they will have any larger quotas second quarter than they have for present quarter, because of producti difficulties.

The new 54-inch mill at Sparro Point, Md., has started production, on a very limited scale, and it is c sidered doubtful if it will get into swing for some months to come beca of lack of hot bands. This unit was cou ing on bands from a new 66-inch mill at that point, but construction been considerably delayed because inability to obtain electrical equipm according to schedule. It now appe that this hot mill will not get into p duction before next year.

Detroit Delivered Prices For Steel Products Revised

Detroit—Arbitrary delivered prices this city have been increased from 1 to 15 points over principal basing po prices on carbon and alloy blooms, lets and slabs; hot-rolled and cold-ished alloy bars; hot-rolled carbon b hot-rolled and cold-finished sheets strip; and enameling sheets. Arbitr delivered prices to eastern Michigan Toledo have been increased from 1 points to 20 points on the same produ The former arbitrary delivered price differentials to these districts had been effect since July 1, 1946.

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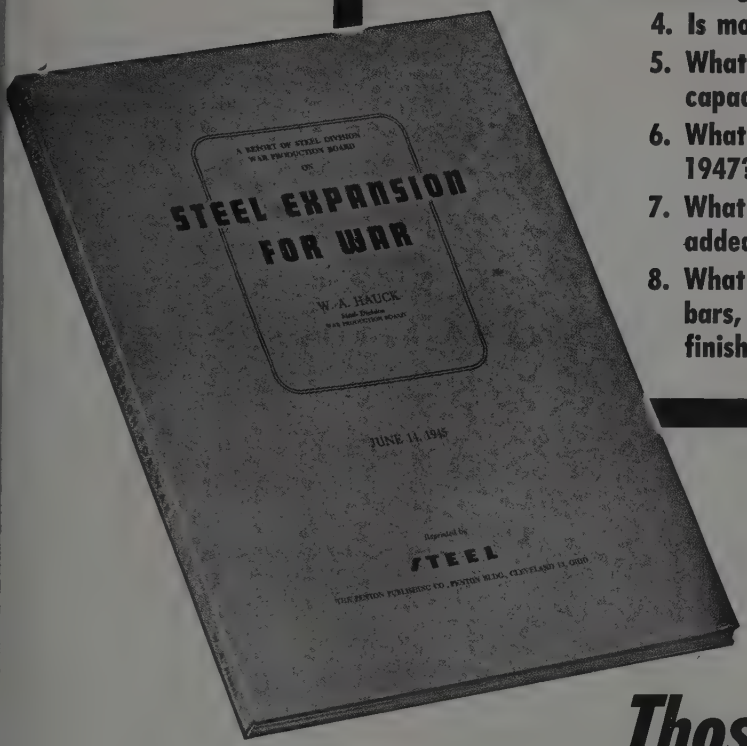
3. What is steelmaking capacity today?
4. Is more capacity needed?
5. What has been the long-term trend in capacity and production?
6. What will sheet and strip capacity be in 1947?
7. What new finishing capacity has been added since the war?
8. What companies make the sheets, strip, bars, plates, shapes, pipe, wire and other finished products you need today?



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Steel Bars . . .

Hope rising that supply of carbon bars will ease somewhat next quarter

Bar Prices, Page 172

Pittsburgh—Under new pricing policy sellers are making thorough study of bar size ranges produced at various price bases. In announcing higher prices to trade producers were specific in limiting the action to range of sizes produced with understanding competition would be met for only the size ranges produced by competitors at same price base or other production points. It is pointed out that the range of sizes varies at almost every production center.

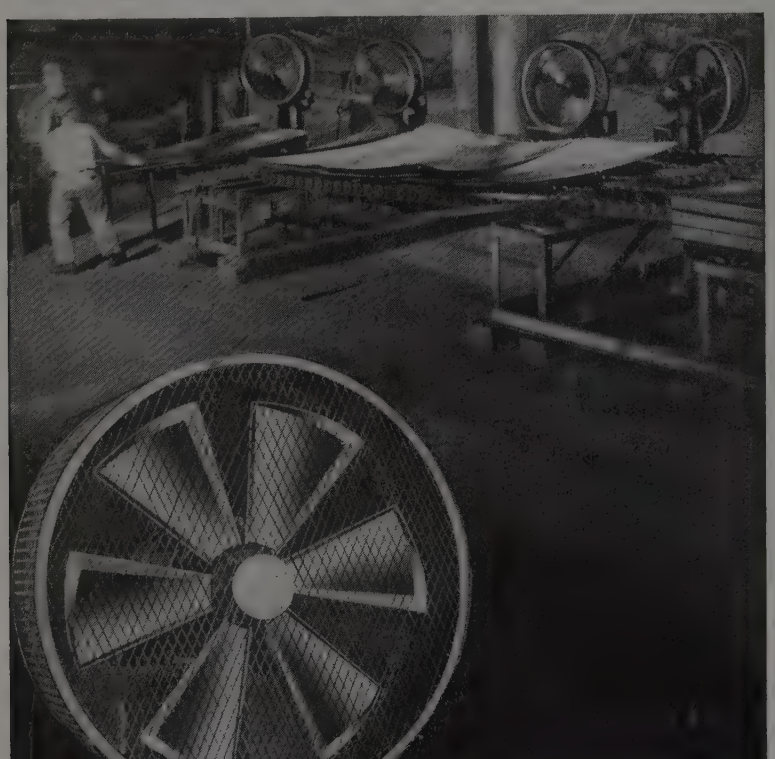
The "killed" steel extra has been clarified by Carnegie-Illinois Steel Corp. as follows: All rounds, squares and hexagons 3-in. in diameter or greater, or of equivalent cross section, plus flats of 12 sq in. in cross section or greater will be sold only as killed steel. Steels to be quenched or carburized must be a fully killed steel; any steel specifying a carbon content exceeding 0.75 maximum is in same category. Generally, any steel used for forgings with carbon content of 0.15 minimum or greater must be specified as "killed".

New York—As carbon bar sellers will enter the second quarter with substantially less arrearages than at the beginning of the current period, hope is gaining ground among consumers that their allotments for next quarter will be somewhat larger. Supply may be a little freer in cold-drawn bars, for the reason that there is not quite the pressure that there was late last year. However, it appears that in the small sizes of both hot and cold-drawn bars supply will be far short of demand. Anything from 1-½ inches down will likely continue scarce. Alloy shipments remain comparatively easy, with hot alloy still available for shipment before the end of March.

Boston—Where carbon bar second quarter allocations are slightly higher the increase centers in larger sizes generally two-inch and over. On large rounds, heavy flats and squares, warehouses and most consumers are already long with demand lagging. Alloys and stainless are relatively easy. Small sizes of hot-rolled carbon bars make up the bulk of mill backlogs and users will get no increase in this tonnage in second quarter. Some bar orders, notably warehouse, are being revised to avoid extras but the extent this can be done is limited by application and use by forge, machine and other fabricating shops. Substantial part of the bar tonnage requires carburizing, machining or some metallurgical practice for which revision in basic specifications is difficult. While the current over-loaded backlog in small sizes would raise doubts, numerous consumers look for first definite easing in supply of major carbon steel products to appear in bars.

Philadelphia—Carbon bar sellers are beginning to set up quotas for next quarter, although action on the part of some of the larger sellers still remains to be taken. On cold drawn carbon bars allocation is fairly general, and on alloy bars there hasn't been any question about the acceptance of tonnage for next quarter, because of ample capacity. Hot alloy bars, in fact, are still being accepted for shipment before the close of this quarter.

Seattle — Local rolling mills are operating steadily and have reduced backlogs, although unfilled orders still involve considerable volume. Demand continues active but new business is confined to emergency orders and the needs of regular customers. Sales executives are now adjusted to the new price schedule which at first caused some confusion. One plant is refusing all merchant bar orders except plain rounds.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Plates . . .

Plate Prices, Page 173

New York—Persistent demand continues for plates, with one eastern mill now practically out of the market for the remainder of this year. This interest is still booking some tonnage on a high selective basis for fourth quarter, but is said to have little capacity left. Certain other mills are booked through the greater part of third quarter and could easily obtain shipment beyond were they so disposed. Some leading producers, however, are quoting on a quarterly basis and should be announcing their quotas for next quarter soon.

Except for ship work, which is lagging badly as has been generally expected, regular plate-consuming groups appear to be pressing for tonnage on a larger scale than heretofore. Car builders, the

nufacturers and various heavy equip-
nt builders are ordering heavily, al-
ugh they are getting far less tonnage
n desired. In the case of railroad
ipment builders, a special effort is
ng made to facilitate shipments, but
nay be second quarter before there
ny appreciable increase in the ton-
e set aside for these consumers.
o work, incidentally, is being con-
d almost entirely to repair and re-
version jobs.

While building construction require-
nts have been lagging somewhat of
due to government restrictions and
uncertainties as to costs and to de-
ries on raw materials and various
lding components, the outlook is for
ansion on a substantially larger
le over the next few months.

Boston—Not until supply of plates
re nearly balances heavy demand
l the current range of prices paid by
w England fabricators be clarified.
at time is conjectural, but by mid-
rd quarter competition for tonnage
y bring about a price test. Including
ras and freights, plate shops are pay-
close to $15 per ton higher for plates,
re from warehouses, and fabricators
likely to bear down on costs at the
t opportunity. Shortage of this prod-
, notably in lighter gage tank quality,
l continue through second quarter,
l in numerous cases shops are unable
reach planned production levels be-
use of lack of plates. Second quarter
duction on delinquent tonnage will
substantial, and the carbuilding pro-
m will take a deep bite into plate
put. Including plates, universal es-
cially, total steel requirements for cars
fourth quarter is estimated at nearly
o million tons. Demand for floor plates
holding surprisingly well.

Pittsburgh—Under new pricing policy
oducers are meeting competition at
rious price bases for only size ranges
plain plate produced at each point. At
ungstown the maximum width is 72
hes by 5/16-in. thick; Cleveland, 90
hes wide by 3/4-in.; at Birmingham
to 128 inches wide. Geneva price
se covers only limited sizes, grades.
ngths, etc.., now produced. Universal
ate, 10 inches and narrower, are not
ognized as price based at Sparrows
int, Claymont or Coatesville.

Demand for plate remains very active,
th fabricators 4 to 6 months behind
oduction schedules due to continued
ght supply. Fabricators report a slight
sing in new inquiries due to inability
most instances to make deliveries
til late this year.

Birmingham—Steel mill interests de-
re the situation in plates remains strin-
nt. There are indications of slight
t up in the overall backlog picture, but
rrent demand continues to outpace
pplies. A marked demand for some of
e lighter gages in plates is evident
hile the needs of shipbuilding and re-
iring and car production holds un-
ated.

Seattle — Plates are in strong demand
t shops are handicapped by inade-
uate mill shipments. Only small jobs,
ainly tanks and boilers, are being
ooked. Operations would be much
avier were supplies available.

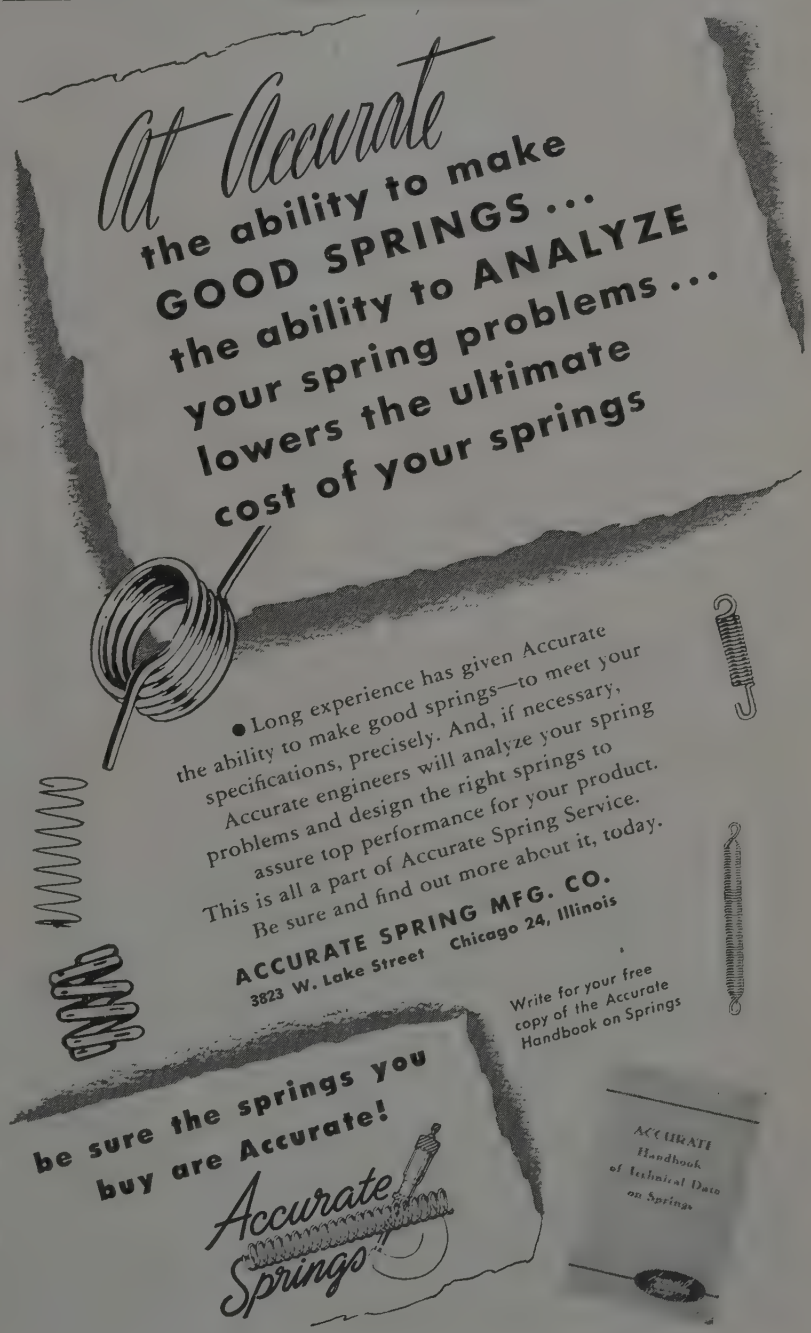
Business pending includes an unstated
nnage for treatment tanks and retorts
r proposed plant at Everett for Ameri-
n Lumber & Treating Co., Chicago,
ds to Seattle, Feb. 14.

Tin Plate . . .

Tin Plate Prices, Page 173

Chicago—Although tin plate facilities in this district are being operated at capacity, demand continues at such a heavy pace that individual requirements fall short of being met. Fact that canmakers are finding it necessary to ration cans to their customers indicates that shortages exist in finished containers as well as canmaking materials. The shortage of box cars remains a matter of concern to tin plate producers, but the railroads manage to furnish sufficient cars to keep shipping docks clear, although production must be piled at intervals.

Pittsburgh—Tin mill product output has held up very well the last few weeks, with practical capacity output sustained by all producers. However, there is some doubt tin plate capacity, even taking into account new production facilities scheduled to be brought in later this year, will be adequate to meet overall requirements. Current product mix in specifications against first-quarter commitments is reported satisfactory. With beer, coffee and other products now permitted to be packaged in tin plate containers, electrolytic tin plate requirements are expanding, and it will take a little time before expected balance in volume between electrolytic and hot-dipped is reached. Tin plate export quotas this quarter have been firmly set at 195,000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tons, and an additional 40,000 tons must be scheduled for April and 25,000 tons for May delivery. Office of International Trade hoped to have the first-quarter mill export load further increased, but the Agricultural Department opposed this on basis deliveries to domestic consumers already on mill books would have to be curtailed.

Wire . . .

Rod shortage hampers wire mills with demand for wire products continuing unabated

Wire Prices, Page 173

New York—Demand for wire continues in excess of supply, except in scattered products. Alloys, welding wire and stainless are relatively easy, but most carbon grades used by the manufacturing trade are extended into second quarter and beyond on some grades. Supply of rods tightens as integrated mills draw a larger percentage into finished wire. Some consumers using two or more grades are unbalanced as to inventories. Bedding manufacturers, for instance, have deferred on so-called border wire until stocks of spring wire are heavier. Steel wool manufacturers expect to pass on substantial advances in wool wire to industrial consumers without much difficulty, but are meeting with stubborn resistance from the domestic household field, the latter turning to substitutes. Except on a few minor items, Washburn Wire Co. has gone on a New York base and more wire products are also based at Trenton, N. J.

Boston—Wire mills are well into second quarter and beyond on numerous products with nonintegrated producers hampered by uncertain rod supply. Practically no progress is made against backlogs and pressure for tonnage by consumers is unabated. Rods suitable for music and spring wire drawing are notably short as rod mills roll a higher ratio into finished wire. This, coupled with geographical selectivity, makes for uncertain semifinished supply. Some, but not much, Swedish semifinished steel is available. At least one Worcester district mill has limited tonnage for valve springs, but the total is not enough to influence the overall production situation. As a matter of fact, some eastern producers have inquiries from Sweden for finished wire. Domestic wire mills took full advantage of the stoppage in Swedish imports for nearly four years by improved metallurgical practice, notably for valve and spring wire and razor blade steel, and are coddling their new outlets. Pressure for wire tonnage by the automotive interests and suppliers is strong and clockmakers are again calling for high-carbon stock. Clock spring wire is an important item in Connecticut.

Pittsburgh—Confusion still prevails on matter of price bases for specific range of sizes, finishes, etc. for merchant and manufacturers wire items. Price base at Cleveland has been dropped on merchant wire products except wire manufactured in that producing district. Pittsburgh Steel and Jones & Laughlin Steel Corp. are no longer shipping directly into Chicago and Worcester on merchant items. In general mills are revising product distribution pattern to avoid as much freight absorption as possible, with some interests withdrawing from s major consuming areas while others meeting competition only to exten size ranges produced at these cen Nonintegrated interests have advan fine weaving wire to $5.95 per pounds; spring wire, to $4.60.

Birmingham—Somewhat more ob able are certain items in wire, not fencing and nails, although far from erage in supply. Wire processors not being supplied in needed and an pated quantities, although the gen opinion is that there has been a sl easing. Mills continue on self alloca basis in most instances.

Structural Shapes . .

Structural Shape Prices, Page 173

New York — Structural bookings 1946, according to the American I tute of Steel Construction, amounte 1,726,057 tons, an increase of 14 cent over the average of 1,509,496 for the same period in the five pre years, 1936-1940. December book amounted to 96,601, the low for year, compared with revised totals November and October of 102,399 142,565, respectively, and with 235,8 the high total for the year which c in January.

Shipments for 1946 amounted to 551,607 tons against 1,464,626 tons, average for the five prewar years. cember shipments amounted to 142, tons, against revised figures for Nov ber and October of 157,274 tons 164,730 tons. The latter figure was highest for the year.

Tonnage available for fabrication w in the next four months, according to Institute. was 164,090 tons, compa with 363,288 tons, the average carryo for the five prewar years.

Current structural buying in the N York area continues somewhat spo with many builders still moving c tiously because of uncertainties as to and deliveries on various building m rials and components, such as electr equipment, building hardware, etc. N ertheless, there is still quite a fair amo of work being figured.

Chicago—Fabricators in this dis are much concerned over the inten of an eastern steelmaker to withd from this area. This company has b a supplier of considerable tonnage in area, particularly on wide flange bea and with steel from mills in the dis having their output allocated to l time customers, fabricators are findin difficult if not impossible to locate sources of supply. The recent adv in freight rates makes it undesirable the eastern mill to absorb more cost i effort to remain in this market. New quiry for fabricated structural steel is ceeding light and awards are in s volume. Evidence is growing of m construction work being deferred bec of high costs. Fabricators have all work they can handle in view of s steel supply.

Boston—Bridge and power plant quirements are perking up, but high c as reflected in unit steel bids for a C necticut river deck plate girder span, retarding some projects. Structural r are spread on delivery promises, altho all are over-balanced on smaller s with no overall easing expected on s

ts before fourth quarter. Neverthe-, second quarter quotas are slightly her with one producer. Most district ricators have been estimating with rehouse structural prices for bulk of ll lot work, although distributors are ited in their ability to finish wanted pe tonnage. Demand for special rail-d car sections looms as an added load structural mills. Manufacturing in-tries in Massachusetts expended $45 lion in new buildings, additions and erations last year according to a sur-by Associated Industries of Massa-usetts.

Philadelphia—While structural steel lers in this district continue light, de-nd has been enlivened somewhat by 1500-ton inquiry for a generating sta-n for the Philadelphia Electric Co., r Norristown, Pa., on which bids are close Feb. 7, and several inquiries for te bridges, most of which had been for bidding some time ago and then pped because of inadequate appro-ations.

Seattle — Fabricating shops are tak-g only small jobs consistent with the dequate supply of steel. Allocations below requirements and consequent-it is inadvisable under present condi-ns to make commitments for major ojects. Release of shipments on strike-und vessels has relieved the situation nporarily but inventories are acutely ort.

einforcing Bars . . .

Reinforcing Bar Prices, Page 173

Chicago—Despite the fact that numer-s major construction programs are be-g held in abeyance because of the con-derably higher costs, reinforcing steel ppliers have all the business they can ndle. Short steel supply is the draw-ck. While large jobs are shrinking, e volume of small miscellaneous build-g, both new and modernization, is avy. Northwestern University, Evan-on, Ill., and Illinois University, Ur-ana, Ill., both having heavy building rograms in prospect, have found it nec-ssary to revise their plans, giving pri-rity to some and sidetracking others for e present. Estimates for construction xceed appropriations by a wide margin.

Philadelphia—Reinforcing steel is dif-cult to obtain, although higher mill rices, as recently announced, are ex-ected to stimulate production in this ne as time goes on. Meanwhile, several ir sized inquiries are pending, includ-g tonnage for a patients' building, By-erry State Hospital, this city, on which ids are to be opened Feb. 19.

Seattle — Demand continues active r reinforcing bars, although major proj-cts are still in the indefinite stage in ew of unexpected high construction osts. The labor situation is more set-ed but is an immediate problem pend-g negotiation for a higher wage.

ubular Goods . . .

Tubular Goods Prices, Page 173

Pittsburgh—Tubing manufacturers re-ort a number of requests to produce andard lighter weight pipe on tube ills, with customers willing to pay remiums up to $50 a ton. Pipe mills e booked through 1947 and into 1949 some instances. Export tubing de-and continues very heavy, but buyers

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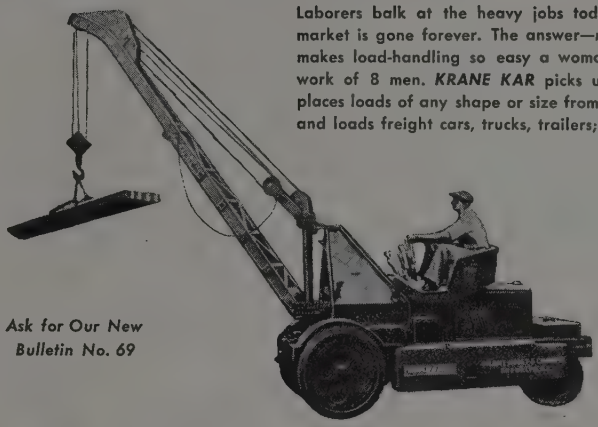

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are said to be more price conscious. Order backlogs on tube mills range between 3 and 4 months on alloy and stainless, 6 months on carbon. Price revisions on tubing have been completed except for copper bearing, high tensile-low alloy, aircraft and other specialities.

Seattle — Inquiry for tubular goods continues active but many large projects have been deferred due to long term deliveries. Current contracts are based on 1948 shipments.

H. C. Purcell, this city, has booked 155 tons of cast iron pipe for Bellingham, Wash. Business pending includes 750 tons at Spokane, Wash., and 150 tons at Wenatchee, Wash., bids in; also, an unstated tonnage for several Seattle local improvements.

Pig Iron . . .

Birdsboro producer raises prices $3 a ton . . . High silicon silvery up $2

Pig Iron Prices, Page 175

Cincinnati—High silicon silvery pig iron prices advanced $2 a ton last week to the basis of $38 a ton, Jackson, O., for 6 to 6.5 per cent grade.

Lag in pig iron shipments is not serious, but volume allotted to foundries is source of common complaint. Most melters would take, if it were available, double the current tonnage. Furnaces have not yet announced allotments for February, the current view being that little improvement in volume can be expected. Foundry coke is in adequate supply for regular customers, but ovens cannot meet all demands.

Philadelphia—The Birdsboro, Pa., pig iron producer has advanced all grades $3 a ton to $34.50, base, for No. 2 foundry, $34 for basic, $35.50 for bessemer, $35 for malleable, and $39 for low phosphorus. This follows an increase of $2 by this producer late last November, an action that was generally followed by other producers. Whether this latest advance by Birdsboro again will be followed by others, however, remains to be seen. Some leading sellers state they contemplate no immediate change.

Advance of $3 at Birdsboro has had the effect of setting up Steelton, Pa., as the governing base on low phos for delivery to this city. Hence, with Steelton base still $36 and the freight rate $2.16, the minimum delivered Philadelphia price is $38.16, compared with the former delivered price of $37.49, which was predicated on a $36 base at Birdsboro and a $1.49 freight rate.

District furnaces report they will be called upon to supply slightly less priority tonnage in February than in the preceding month, although some state that the reduction will not compensate for the loss in working time resulting from the fewer days in February. Consequently, nonrated consumers, which comprise the great majority of buyers in this district, contemplate another exceedingly tough period ahead, and one likely to be made still tougher by the upward trend in cast scrap prices. Producers again face the painful duty of telling many of their regular customers there is little they can do about the supply situation. One producer of foundry and malleable iron is now being forced to allocate 12 per cent of his average monthly production of these grades for the past five years to only 10 per cent of his regular trade.

Meanwhile, certain rated consumers are in such excellent position with regard to pig iron that they are having to buy little cast scrap. They are offering to buy cast scrap, but at a price that is well below the market with a result that they are getting only small quantities, usually scattered truck lots from nearby sources, and under the circumstances they apparently are satisfied. Their offering prices are around $41, delivered, compared with at least $44 to $45, delivered, for the general market, and even as high as $50 in some scattered instances.

While supply of by-product coke continues scarce, the fuel situation is being eased slightly by larger arrivals of beehive coke from western Pennsylvania.

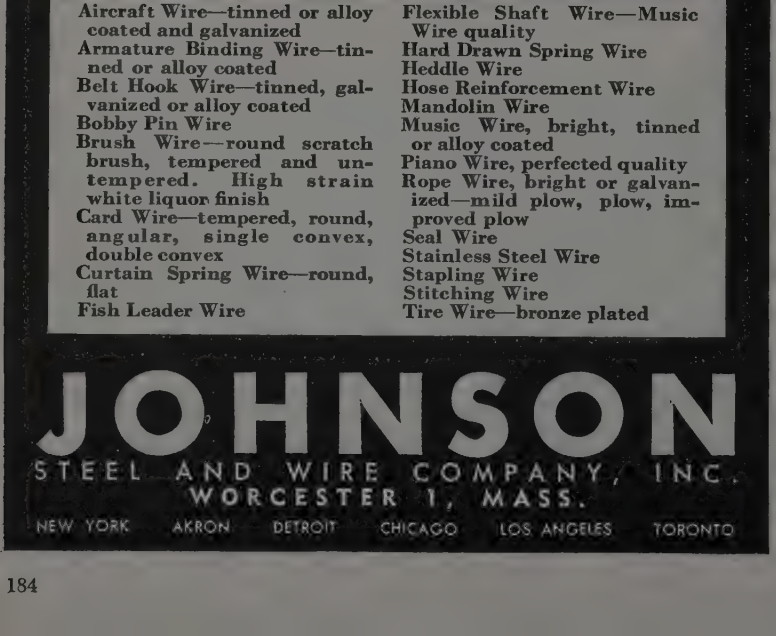
New York—Pig iron sellers report that allotments of rated tonnage for February are nearly equal to those for the month just ended, with the situation further complicated by the fact that February is a short month. The net result seems to be that non-rated consumers will receive even less than in January. Some hope had been expressed by these buyers that January rated allotments would represent the peak following as they did a month when many priority tonnages were cancelled because of a reduction in output due to the coal strike. Some believed that by February there would be a little easing in the amount of priority tonnage allocated. However, this does not seem to be the case.

Meanwhile, district foundries which are not on a rated basis, and which constitute by far the majority in the district, are experiencing extreme difficulty. Some declare that the shortage of iron is the worst in their experience. Appeals are being made not only to the Civilian Production Administration but to Congressmen in an effort to obtain some relief. It is difficult to estimate average operations of foundries doing nonrated business, but it is clear that a number are operating at well below 50 per cent, and on almost a day-to-day basis. A few foundries are down completely.

Adding to complications also is the continued shortage in coke. While the situation appeared a little easier a while ago and certainly easier than during the period when the soft coal mines were down late last year, there is still an acute shortage of coke. This is ascribed in part to lack of reserves at the producing ovens and to much heavier seasonal demands from the gas companies.

Leading Buffalo producer put a furnace into blast Jan. 30, thus giving it three furnaces now in operation.

Boston—Although supplies are spread thin with some heavier consumers needing more iron, Mystic furnace production is gradually improving supply of foundry grades. Purchase of foreign iron has supplemented textile mill equipment inventories; price paid is in the vicinity of $70, Boston. Buffalo shipments will be limited this month, but will probably be over January when little tonnage arrived from that producing area. February certified allocations are unchanged or slightly higher, around 4200 tons on Mystic. No improvement in volume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Hose Reinforcement Wire
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basic is seen in the near future, and ilters of that grade are operating on se margins; at times level of melt is dangered. The Everett furnace will ke no basic under the current pre- um program. Foundry subcontracting ds at a substantial rate, although ow the war time peak.

ake Superior Iron Ore rices Rise 50 Cents a Ton

Cleveland—Lake Superior iron ore ices have advanced 50 cents a ton on bstantial contract sales for the 1947 ason. All leading sellers in this district e quoting the higher prices which are follows per gross ton for 51.50 per nt material at the lower lake ports: ld Range bessemer, $5.95; Old Range onbessemer, $5.80; Mesabi bessemer, 5.70; Mesabi nonbessemer and high nosphorus, $5.55.

crap . . .

Prices advance in Philadelphia to basis of $31.50 for No. 1 heavy melting

Scrap Prices, Page 176

Philadelphia—Prices on steelmaking ades in this district are responding to e generally stronger tone which pre- ils throughout the scrap market. De- vered prices in the Philadelphia dis- ict are now at a minimum of $31.50 r Nos. 1 and 2 heavy melting steel, o. 1 busheling and Nos. 1 and 2 undles.

With pig iron generally scarce and nsumers outside the district bidding r scrap here, sentiment is strong and is possible that even higher prices may evelop. Sellers are somewhat more cau- ous in accepting orders, although the ovement of scrap against back orders ontinues heavy. One leading eastern ennsylvania consumer reported recent ece pts of melting steel as the largest many weeks, with the situation being elped by unusually mild weather for his season of the year. In fact, weather o far this winter has been generally avorable for the handling and move- ent of scrap.

Higher prices are also quoted for No. bundles at $29.50, delivered; machine hop turnings, mixed borings and turn- ngs, short shovel turnings and cast iron orings at $24. Low phos and specialty grades are stronger again with bar crops nd plate, cast steel, and punchings and late scrap at $35 to $36; electric fur- ace bundles, $35; heavy turnings, $33 o $33.50; cut structural and plate scrap, $36; and No. 1 chemical borings, $31.50 o $32.

No. 1 cupola cast is higher with the general market at $44 to $45, although n some instances still higher prices are eing paid. Charging box and heavy reakable cast are now holding at $42.50, delivered; unstripped motor blocks, $41; clean auto cast, $44 to $45; and No. 1 wheels, $43.

New York—Brokers here have ad- vanced their buying prices to $30, fob shipping point, on Nos. 1 and 2 heavy melting steel, No. 1 busheling, Nos. 1 and 2 bundles. They are paying $28 for

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No. 3 bundles, $21.50 to $22 for machine shop turnings and mixed borings and turnings, and $23.50 to $24 for short shovel turnings.

Punchings and plate scrap are strong at $30, electric furnace bundles at $30 to $31, and cut structural and plate scrap at $30. There has been no recent change in the cast iron grades and the local market on No. 1 chemical borings has eased to around $23 to $24.

Further increases in the melting steel grades have placed the brokers' buying market here at higher levels for the third consecutive week and reflect particularly heavy pressure for tonnage in the Pittsburgh area.

Pittsburgh—Local mills are not pressing for scrap tonnage, reflecting fairly good inventories and concerted effort to stabilize prices. Mills are using greater proportion of hot metal in open hearths which has helped offset general tight scrap supply situation. For scrap purchased in this area, mills continue to set a ceiling at $32.50 per ton for open-hearth grades; however, some scrap is being brought into Pittsburgh under special deals at substantially above this figure. The market in New England, for example, is around $28.50 per ton, which means that under these special deals the mills must absorb $7.73 freight in bringing scrap here, or a delivered price of $36.73 including brokers commission. The market at Buffalo is $32.50, making scrap from that area delivered Pittsburgh of $37.24, including commission and $4.24 freight.

Cast scrap supply is somewhat more plentiful based on tonnage offered here recently at price range of $42 to $43, delivered, for No. 1 cupola cast. A number of foundries continue out of the market due to high cast scrap prices. No substantial improvement in supply of steelmaking grades is indicated until spring, with distribution of limited supply of production scrap continuing on allocation basis to specific mills for reciprocity reasons.

Railroad heavy melting steel appears stabilized at $32.50 per ton, with normal differentials for specialties.

Chicago—Somewhat higher prices for open-hearth scrap in certain Eastern districts has not affected this market. The price of $30 holds steady here in spite of extremely heavy demand. Flow of material is in good volume, but still falls short of melting requirements. For the third straight week, steelmaking operations are at 90 per cent of capacity, a figure which is dependent solely on combined supply of scrap and blast furnace hot metal. Output of the latter is at full capacity; thus, scrap is the variable. In many respects, conditions in this district are becoming fairly well stabilized.

Boston — Advances in steelmaking grades of scrap are overcoming resistance of district consumers, who, while in need of tonnage, are striving to halt the upward trend by keeping out of the market as long as possible. Scrap prices are far out of line with pig iron in both steelmaking and foundry grades. That full advantage is being taken of current conditions is not setting too well with purchasing departments. Heavy melting steel has moved up $1.50 to $2 a ton on the basis of outside sales. Cast strong but unchanged at the wide spread of $40 to $45, delivered. Stove plate holds around $39, delivered. The current situation as to raw materials for foundry melting is paradoxical, New England consumers are paying the lowest price in the country for pig iron, but are on a limb as regards scrap.

Detroit—All production scrap from automotive plants continues to move on directives to specified mills, and no lists are issued for bids. The latest Chevrolet "list," for example, included nothing beyond eight cars of mill scale. Dealers buying prices on open-hearth and blast furnace material have held steady for the past three weeks or more. Sentimental weakness in cast scrap prices is not reflected in lower quotations, but buying has dwindled, indicating possibly some resistance to current high prices. Some scrap is still "leaking" on scrap-for-sheet-steel deals but there is little the trade can do about it and the tonnage involved is not large.

Buffalo — Advanced scrap prices are being substantiated by additional purchases. Consumers who have been reluctant to recognize recently-increased prices now are reported placing orders. Fresh business took place in No. 2 heavy melting scrap at $32 a ton. Some dealers, however, continue to favor a range of $30 to $32. Sales also were reported at $33 to $34 a ton for No. 1 heavy melting. Tonnage of No. 1 material is limited. A return of milder weather, however, has spurred collections of No. 1 heavy melting and bundle grades. Malleable scrap remains scarce with prices gyrating according to the urgency of the individual consumer's demand.

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Rails, Cars . . .

Track Material Prices, Page 173

New York—Award of 3000 freight cars by the Louisville & Nashville features new car buying, and assures a fairly good total for the month just ended. Official statistics of the American Railway Car Institute should be available shortly. Several sizeable lists are being figured.

Demand for diesel locomotives is expanding, with the Pennsylvania Railroad having closed on 25, with 19 passenger locomotives to be of 6000 horsepower and 6 freight locomotives of 7500 horsepower. Nine of these engines will be built by the Baldwin Locomotive Works, Eddystone, Pa., six by the Electro-Motive Division of the General Motors Corp., La Grange, Ill., and five by the American Locomotive Co., New York. Indiana has closed on 16 steam locomotives to Baldwin.

Warehouse . . .

Warehouse Prices, Page 174

New York—Slight improvement in replacements is noted by some warehouses. Gains in nails, however, are larger in galvanized than in bright wire nails. Receipts of steel, notably in lighter products and smaller sizes of heavier goods, will have to increase substantially before inventories will be in balance to meet heavy and unabated demand. Exceptions are alloys, stainless and heavier sizes of carbon bars. Perhaps indicating a future trend, demand for even smaller sizes of cold-finished carbon bars is slackening. Although price resistance has

nestic consumers is minor, some ex- t cancellations have been directed to bers, including cold-finished bars.

Boston—Cold-rolled strip has been usted to 6.36c by most warehouses for 0 pounds and over. Carbon plates ng 4.80c with some jobbers, although re are still differences in quotations ong the various interests. In effect, warehouse price structure has been uilt and is still subject to minor re- ons. Demand for steel from ware- ses is heavy and to meet it stocks unbalanced, although slight improve- nt in replacements is noted. As de- nd is centered largely in smaller car- n products, warehouses are well sup- ed with alloys, larger and heavier s, stainless and similar products on ich a selling job appears ahead.

Pittsburgh—Uniform warehouse steel ces now prevail here, with further ward revision in shapes, plain and or plates put into effect by Jones & ughlin Steel Corp.'s warehouse. Dis- utors recently established new price se on hot-rolled alloy (4140) bars as- led of $6.60 for city and country de- ery. New cold-rolled strip price base $4.95 for city and $4.85 for country livery, but this item is only handled Follansbee Steel Corp.'s warehouse. general new warehouse steel prices ve been increased somewhat more n mill price bases plus revised extras recover the normal price spread of to $1.25 over mill price levels that re in effect prior to OPA. Distribu- s are revising mill specifications where ssible to avoid new packaging extras, dering to dead lengths, etc. For ex- mple, distributors are revising bun- ing specifications to larger quantities d absorbing extra handling cost; or- ring cold-finished and hot-rolled bar ck in random lengths with 2-foot lee- ay, thus avoiding dead length mill tra of 15 cents.

Philadelphia—Jobbers here have con- uded an excellent month, and look for- ard to continued good business for me weeks to come, especially now that e labor outlook has taken a decided rn for the better. Mill receipts last onth were better than in the month fore, and these receipts are expected hold up, at least on a daily basis, rough February and March.

Chicago—Warehouses continue to be ndicapped by extremely low inven- ries. Meanwhile, demand continues in avy volume, the recent increase in ices appearing to have had no effect reducing or deferring business. Flat lled products, principally sheets, strip d carbon bars, are the products in ortest supply. While mill shipments these items to warehouse accounts is eable, the aggregate falls short of de- and by substantial margins. Small ructurals also are tight. Alloys are in fficient supply to accommodate con- mers' needs.

Cincinnati — Demand for warehouse el apparently is expanding, although is surmise may be due to reduced ship- nts from mills. Structurals are par- ularly scarce, with requirements ac- e. Almost all items are in active de- and, against depleted stocks, with ex- ption of heavy cold-finished.

Seattle — Jobbing houses report a avy turnover of all items. Release of ter shipments has eased the situation some items but sheets continue ex-

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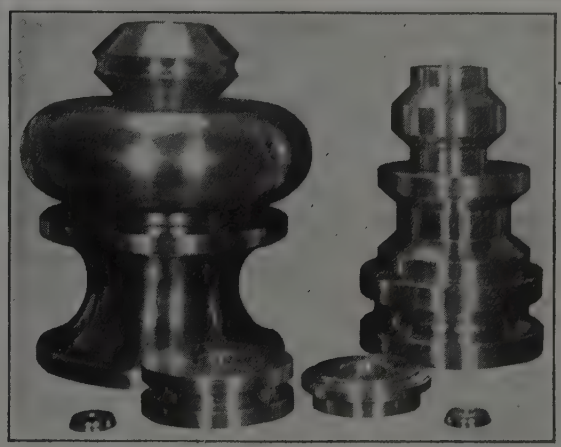

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tremely critical. The new price levels have not retarded buying. Some black market operations, especially in sheets, are evident in this area. Demand is strong for plates, bars, shapes and alloys for which items the supply is easier, although none is equal to market requirements. New price lists absorbing recent mill increases have been issued to the trade.

Canada . . .

Toronto, Ont.—For the month of October, Canadian steel mills produced 154,183 tons of steel and shipped primary shapes totalling 172,580 net tons, which compares with 71,341 tons made and 72,070 tons shipped in September. The lower tonnages in September were due entirely to curtailed production in steel mills due to strikes. October totals include 146,979 tons of carbon steel made and 164,099 tons of iron and steel shapes shipped; 7,214 tons of alloy steel shapes made and 8,481 tons shipped.

For the first ten months of 1946, output of primary iron and steel shapes in Canada totalled 1,885,595 net tons and 1,896,638 tons shipped.

During October total shipments included 10,734 tons of semifinished shapes; 9,255 tons of structurals, 22,110 tons of plates; 1681 tons of galvanized sheets; 448 tons of tool steel, 6336 tons of castings and 42,914 tons of other shapes.

Of the October shipments, 15,245 went direct to railways and railway car shops, 7255 tons to pressing, forming and stamping plants, 19,294 tons to merchant trade products, 23,352 tons to building construction, 16,310 tons to the containers industry, 6118 tons to agricultural equipment, 8011 tons to the automotive industry, 12,496 tons to machinery plants, 3664 tons to shipbuilding, 5984 tons to mining, lumbering, etc., and 2379 tons to miscellaneous industries. Wholesalers and warehousing accounted for 19,769 tons; producers' interchange, 25,484 tons and exports, 7219 tons.

Nonferrous Metals . . .

Nonferrous Prices, Page 177

New York — Office of War Mobilization and Reconversion has revised its regulations for making premium payments to producers of copper, lead and zinc. Under the new ruling, producers may not include as part of their "reasonable costs" any increases in royalties they may have paid above the level of royalty rates in effect Nov. 10.

The government's premium payments on these metals is tied to the cost of production. Royalty payments by a producer to the actual owners of the land which is mined are included as a part of the cost of production. However, OWMR now rules that it will accept as part of the cost only that part of the royalty which was in effect on Nov. 10. In other words, a producer who is paying increased royalties cannot be reimbursed by higher premium payments. The agency said it was acting to prevent undue diversion of premium money into royalty payments following the revocation on Nov. 10 last of a government regulation setting maximum royalty rates.

Copper — American Smelting & Refining Co. advanced the price of electrolytic copper last week one cent a pound to the basis of 20.50c, Connecticut Valley. Other leading sellers had not followed by late in the week.

As of the close of business, Dec. 3 fabricators' refined stocks totaled 408,9 tons compared with 375,618 tons a ye earlier. Working stocks of 286,418 to left visible supplies of 122,525 tons which is added 59,421 tons of copp which had been purchased but und livered, making total stocks and purchas 181,946 tons. Unfilled orders at the yea end totaled 526,648 tons. Stocks ava able for sale were estimated minus 344 702 tons.

Silver — Demand for foreign silv in the domestic market remained sm last week. The silvermakers and industri users continued to send in scrap met for remelting and reuse. At the sam time these commercial users of silver a believed to be reducing inventories. Pric held unchanged at 71.00c an ounce f foreign mined metal and 70.75c f domestic metal.

Repeal of Excise Tax on Copper Imports Requested

(*Continued from Page* 79)

bate. One group argues that the Unite States needs far more copper than ca be provided domestically, and that th importation of this needed copper wi the 4-cent tax added would be unnece sarily costly to consumers and would di courage importations. The opposi school of thought maintains that the cu rent heavy demand stems from accum lated needs, with the present strong d mand therefore only temporary, and th for the economic well-being of the Un ed States the domestic copper indust should be protected.

Recently, one opponent of the 4-ce tax said there is absolutely no need for tariff on copper for perhaps the ne three to five years, as domestic demar in all likelihood will continue to run in excess of domestic supplies. And, said, as the same situation exists in cou tries outside the United States there consequently no threat to the Americ economy and therefore no necessity so-called tariff protection at this tim

The two primary considerations volved in the imposition of a tariff protection for domestic industry and r enue, the tax opponent said. The f mer, he declared, obviously is not nece now. As to revenue, he pointed that the government has been waiv the tax on all foreign copper it has p chased during the past several years allocated to consumers at the prevail domestic price, and that the governm will be no worse off if the excise tax abolished.

Recently, Charles F. Willis, secret Arizona Small Mine Operators Asso tion, declared that manufacurers and f eign producers refuse to admit that present shortage of copper is tempor and is due primarily to pent-up requ

nts combined with the fact that the left the mines in the U. S. in poor dition to meet such an extraordinary nand. "Since during the war all ef- ts were directed toward production, loration and development were neg- ted and plants were not well main- ed. Also labor shortage and postwar kes have cut down production at a e when greater output was essential," . Willis stated.

n its appeal, the Scovill Mfg. Co said t domestic copper production is esti- ted not to exceed 80,000 tons month- while the demand for copper shows tendency to decrease. Delivery of pper in December was 148,218 tons, mprised of 87,642 tons of domestic d 60,576 tons of foreign copper (the ter being duty paid copper fur- hed by Metals Reserve), the company d. "The obvious monthly deficit can made up only by purchase of foreign pper," the company declared.

TRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

35 tons, Connecticut State bridge, Old Lyme and Old Saybrook, to American Bridge Co., Pittsburgh. Award of about 2500 tons of piling through Merritt-Chapman & Scott, New York, expected to be announced shortly.

00 tons, fourth section to power plant, Venice, Ill., for Union Electric Co. divided between Stupp Bros. Bridge & Iron Co., St. Louis, and Missouri Valley Bridge & Iron Works, Leavenworth, Kans.; Stone & Webster Engineering Corp., Boston, engineers.

00 tons, boiler house, Denver, for Public Service Co. of Colorado, to Midwest Steel & Iron Works Co., Denver.

4 tons, coffer dam, Spec. 1571, Shasta dam, Central Valley, Calif., for Bureau of Reclamation, to American Bridge Co., Pittsburgh; bids to Denver, Jan. 6.

0 tons, crane runway, China, to American Bridge Co., Pittsburgh.

5 tons, fertilizer plant, Saginaw, Mich., for Farm Bureau Service, to Jarvis Engineering Works, Lansing, Mich.

0 tons, electrical engineering building, Urbana, Ill., for University of Illinois, to Duffin Iron Co., Chicago; John Felmley Co., Bloomington, Ill., contractor; bids Jan. 21.

0 tons, power house, Harryatt, Ga., for Georgia Power Co., to Virginia Bridge Co., Roanoke, Va.

0 tons, storage building, Baton Rouge, La., to Virginia Bridge Co., Roanoke, Va.

0 tons, extension to Solvay Process plant, Baton Rouge, La., to Virginia Bridge Co., Roanoke, Va.

8 tons, penstocks for Kortes power plant, Casper, Wyo., for Bureau of Reclamation, to Darby Products of Steel Plate Corp., Kansas City, Kans.; bids Jan. 13.

5 tons, roof and framing for machine shop, Spec. 1567, Grand Coulee dam, Odair, Wash., for Bureau of Reclamation, to Worden-Allen Co., Milwaukee; bids to Denver, Jan. 6.

5 tons, power plant, Bridgeport Brass Co., to Haarmann Steel Co., Holyoke, Mass.; Stone & Webster Engineering Corp., Boston, contractor-engineer.

0 tons, bridge, Swink, Colo., for state, to Midwest Steel & Iron Works Co., Denver; Brown Construction Co., contractor.

0 tons, building, Cedar Rapids, Iowa, for Cherry-Burrell Corp., to Iowa Steel & Iron Works, Cedar Rapids, Iowa.

tons, stop logs, Spec. 1560, Grand Coulee dam, Odair, Wash., for Bureau of Reclamation, to Consclidated Steel Corp., Los Angeles; bids to Denver, Jan. 2.

STRUCTURAL STEEL PENDING

8000 tons, Augusta, Ga., for U. S. Engineer.

4500 tons, barges, Middletown, O., for American Rolling Mill Co.

4500 tons, generating station, for Philadelphia Electric Co., near Norristown, Pa.; bids due Feb. 7.

3655 tons, steel piling, including 2847 tons sheet piling and 808 tons bearing piling, Cont. No. 1, Northerly Island Airport, Chicago, for City of Chicago; bids Feb. 13.

1900 tons, new bessemer converter plant, Ecorse, Mich., for Great Lakes Steel Corp.

700 tons, board plant, Sigurd, Utah, for United States Gypsum Co.

575 tons, two bridges, route S-3, section 4A, carrying highway over tracks, Delaware, Lackawanna & Western railroad, Clifton, N. J.; bids Feb. 17, Spencer Mill Jr., state highway commissioner, Trenton, N. J.

575 tons, state highway bridge work, S-3, section 4-A, Passaic county, New Jersey, bids Feb. 17; also 230 tons of reinforcing steel, as noted in previous issue. Bids on a 2000-ton bascule span in that county is up for bids Feb. 13, a development that will also require 216 tons of reinforcing steel and 200 tons of machinery.

550 tons, mill building, Memphis, Tenn.; H. K. Ferguson Co., Cleveland, contractor.

475 tons, continuous girder highway bridge, Stratford, Iowa, for state; recent bids rejected.

420 tons, diesel shop, Barstow, Calif., for Atchison, Topeka & Santa Fe Railroad; bids Jan. 27.

405 tons, railroad grade separation, Fayette county, Ill., for State Highways Division; bids Feb. 7.

350 tons, highway bridge, Port Gibson, Miss., for State Highway Department.

205 tons, state bridge, Cambria county, Pennsylvania, bids Mar. 3.

185 tons, bridge, Sec. 3F, Marshall county, Ill., for State Highways Division; bids of Jan. 10 rejected; new bids Feb. 7.

120 tons, bridge, Sec. 43F, Pike county, Ill., for State Highways Division; bids of Jan. 10 rejected; new bids Feb. 7.

112 tons, two-span I-beam bridge, 168-foot span, Richmond, Vt.; bids to town clerk, that town, Feb. 10.

105 tons, state bridge, LR-20046, Crawford county, Pennsylvania, bids Mar. 3.

105 tons, state bridge, Elmhurst township, Lackawanna county, Pennsylvania, bids Feb. 21.

100 tons, state bridge, York county, Pennsylvania, bids Mar. 3.

Unstated, steel frame for timber treating plant, Everett, Wash., also several retorts; bids to Engineer M. O. Sylliaasen, Seattle, Feb. 14.

Unstated, steel frame telephone exchange addition, Eugene, Oreg., for Pacific Telephone & Telegraph Co.; general contract to Waale-Camplan Co., Portland, Oreg., low $142,000.

Unstated, prefabricated machine shop, two radial gates and two gate hoists for projects in Idaho; bids to Bureau of Reclamation, Denver, Feb. 19 and 24, respectively.

REINFORCING BARS . . .

REINFORCING BARS PLACED

300 tons, milling plant, Huron, O., for Eastern Mill Co-operative Association, to Bethlehem Steel Co., Bethlehem, Pa.; James Stewart Corp., Chicago, Contractor.

230 tons, two bridges, route S-3, route 4A, carrying highway over tracks, Delaware, Lackawanna & Western railroad, Clifton, N. J.;

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Coil Stock
COIL stock, fed by LITTELL Automatic Centering Reels, insures efficient, fast, accurate, economical production. It permits continuous feeding, prevents waste of material and provides automatic roll feeding direct from coils.
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bids Feb. 17, Spencer Miller Jr., state highway commissioner, Trenton.

200 tons, science hall and boiler plant, state college, Ellensburg, Wash., to Northwest Steel Rolling Mills, Seattle; general contract to MacLean Construction Co., Seattle, low, $1,214,870.

151 tons, including 100 tons wire mesh and 51 tons bars, Cont. 2791, Kosciusko county, Ind., for State Highway Commission, mesh to American Steel & Wire Co., Chicago, and bars to Carnegie-Illinois Steel Corp., Chicago; Gast Construction Co., Warsaw, Ind., contractor; bids Jan. 7.

Unstated, miscellaneous sizes, for Department of Public Works, Chicago, as ordered for Bureau of Engineering of the department during period ending Dec. 31, 1947; bids Feb. 7.

REINFORCING BARS PENDING

600 tons, spillway Dorena dam, Oregon; bids to U. S. engineer, Portland, Oreg., March 20.

230 tons, state bridge, Passaic county, New Jersey, bids Feb. 17; also 575 tons of structurals, and 216 tons, state bridge, Passaic county, New Jersey, bids Feb. 13; also 2000 tons of shapes, as noted in a previous issue, and 200 tons of machinery.

120 tons, electrical engineering building, Urbana, Ill., for University of Illinois; general contract to John Felmley Co., Bloomington, Ill.; bids Jan. 21.

Unstated, $750,000 warehouse for Montgomery Ward & Co., Portland, Oreg.; bids soon.

Unstated, mechanical engineering building, Urbana, Ill., for University of Illinois; bids Feb. 3.

Unstated tonnage, patients building, Byberry State Hospital, Philadelphia; bids Feb. 19.

PIPE . . .

CAST IRON PIPE PLACED

200 tons, 6 and 8-inch, Springfield, Mass., to United States Pipe & Foundry Co., Burlington, N. J.

155 tons, Bellingham, Wash., project, to H. G. Purcell, Seattle, for U. S. Pipe & Foundry Co., Burlington, N. J.

STEEL PIPE PLACED

140 tons, large diameter fabricated pipe, for installation in connection with gas holder development for Philadelphia Electric Co., at Chester, Pa., to Bethlehem Steel Co., Bethlehem, Pa.

CAST IRON PIPE PENDING

750 tons, various sizes for Spokane, Wash., bids in Jan. 23.

RAILS, CARS . . .

RAILS PLACED

Florida East Coast, 16,500 tons, with 12,500 tons going to the Tennessee Coal, Iron & Railroad Co., Birmingham, and 4000 tons to Bethlehem Steel Co., Bethlehem, Pa.

LOCOMOTIVES PLACED

India, 16 steam locomotives, to Baldwin Locomotive Works, Eddystone, Pa.

Pennsylvania Railroad, 25 diesel locomotives, comprising 19 passenger locomotives of 6000 horsepower and 6 freight locomotives of 7500 horsepower; 9 to Baldwin Locomotive Works, Eddystone, Pa., 6 to Electro-Motive Division of General Motors Corp., La Grange, Ill., 5 to American Locomotive Co., New York.

RAILROAD CARS PLACED

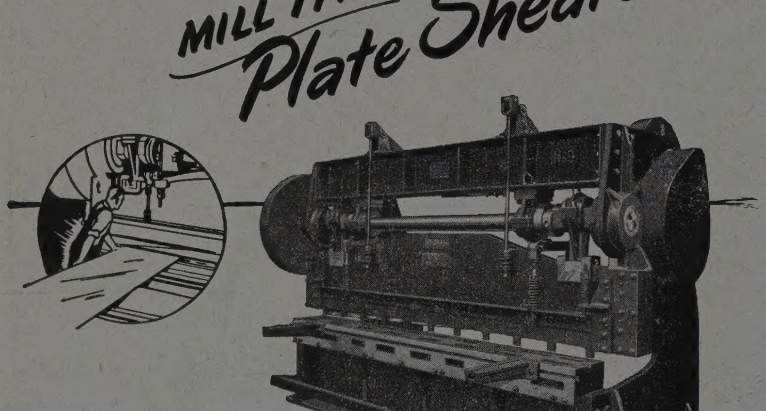
Chesapeake & Ohio, 1000 hopper cars, to General American Transportation Corp., Chicago.

Louisville & Nashville's order for 3000 cars was distributed as follows: 1600 fifty-ton hopper cars to Pullman-Standard Car Mfg. Co., Chicago; 1200 fifty-ton hopper cars and 200 seventy-ton ballast cars to American Car & Foundry Co., New York.

New York City Board of Transportation, 10 stainless steel subway cars, to the Budd Co., Philadelphia.

THOMAS

MILL TYPE Plate Shears



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6

CONSTRUCTION AND ENTERPRISE

ALABAMA

BIRMINGHAM—Allen Unit Construction In has been formed by Charles T. Allen a Charles T. Allen Jr. to manufacture precas steel and concrete houses in sections.

TUSCALOOSA, ALA.—Gulf States Pap Corp. has awarded contract to H. K. Fe guson Co., Cleveland, for engineering, co struction and installation of equipment in new plant addition which will boost pap production by more than 50 per cent.

CALIFORNIA

EAST LOS ANGELES, CALIF. — Wilcox C 6800 McKinley Ave., Los Angeles, has awar ed a $215,000 contract to H. Mayson, 9215 Hooper Ave., Los Angeles, for a factory 4463 Bandini Blvd.

LOS ANGELES—Mission Appliance Co., 71 McKinley Ave., has contracted for a 1-sto 150 x 800 ft factory with Al-Co Co., 54 Flemish Village Lane, for an approxima $425,000.

LOS ANGELES — United States Rubber C 5675 Anaheim-Telegraph Rd., plans co struction of a 1-story warehouse, 360 x 5 ft to cost $896,000. L. A. Parker, 408 Spring St., is engineer and architect.

YUMA CITY, CALIF. — Pacific Gas & Ele tric Co., 245 Market St., San Francisc has plans under way for a substation cost $245,328.

CONNECTICUT

EAST HARTFORD, CONN. — Pratt & Wh ney Division, United Aircraft Corp., 4 Main St., has awarded a contract to Turn Construction Co., 38 Newbury St., Boston, f conversion of a factory to a refrigerati plant at cost of $175,000. Engineer is Alb Kahn Associated Architects-Engineers In New Center Bldg., Detroit.

MERIDEN, CONN.—International Silver C State St., has awarded a contract to H. Wal Lines Co., 134 State St., to build a thre story factory which will cost $191,700.

FLORIDA

CHATTAHOOCHEE, FLA.—U. S. Engine Office, Jacksonville, Fla., is planning co struction of 6400-ft dam and powerhou with 27,000-kw capacity, to cost appro mately $24 million.

JACKSONVILLE, FLA.—General Chemi Co., New York, c/o district constructi manager, Jacksonville, Fla., plans constructi of 2-story sulphate alumina plant, to co $260,000. CPA approval has been receive

GEORGIA

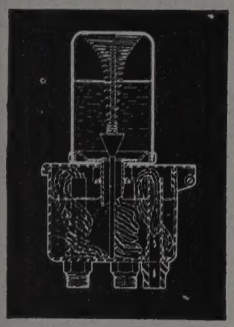
ATLANTA—Peaslee-Gaulbert Corp., Louisvil contemplates construction of plant to conta about 150,000 sq ft, which will be used i manufacture of restaurant and hotel equi ment, refrigerators, etc.

ATLANTA—Georgia Power Co., 75 Marie St., has awarded contract for substructu of electric generating plant to be built abo 7 miles northwest of Atlanta on Chattah chee river at cost of $670,000 to Gilb Beers, Atlanta.

ATLANTA—Fairbanks, Morse & Co., 5 Whitehall St. SW, has awarded contract Ben J. Massell Co., Pryor St., for constru tion of warehouse and repair shop for el trical appliances and hardware goods, to c approximately $150,000. H. A. Rawlins, Pryor St. NE, architect.

ATLANTA—Georgia Power Co., W. Mitchell, president, plans expenditure t year of more than $17 million for extensi and improvement of services over the sta Included in the program will be constructi of 900 miles of electric distribution lines, 3 miles of new rural lines and 135 miles high tension transmission lines; also includ

Lubricate...



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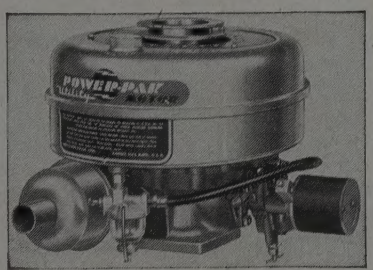

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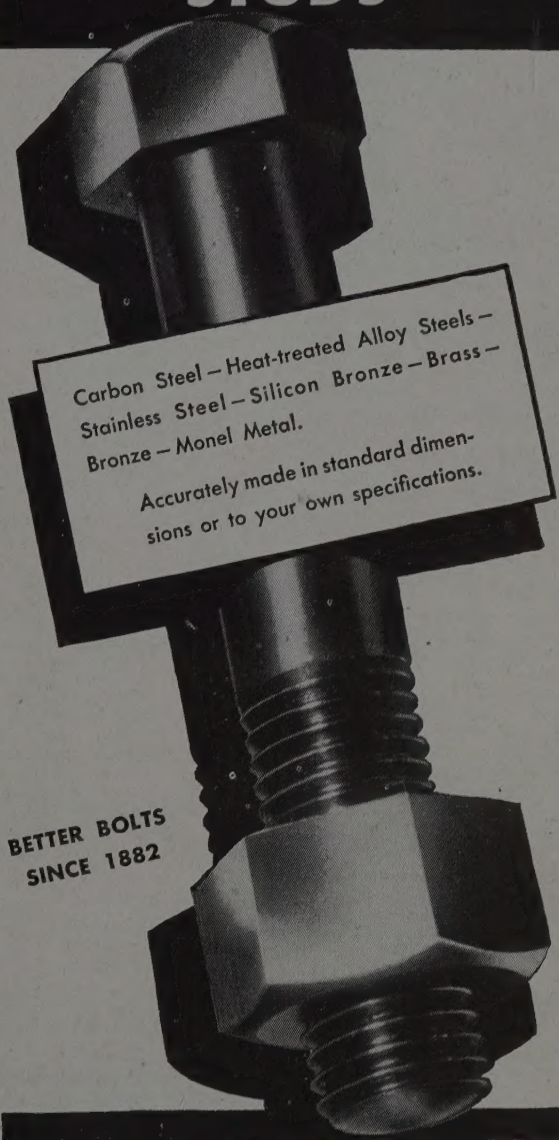

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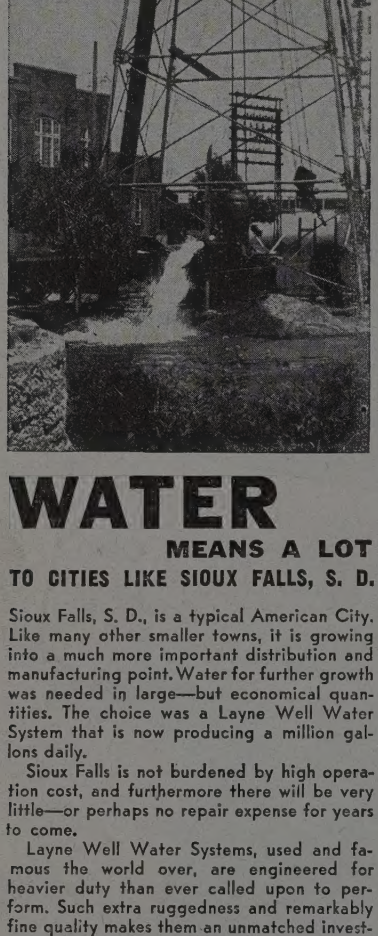

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will be addition of 45 new substations with total capacity of 51,800 kw and enlargement of 67 existing substations.

WAYCROSS, GA.—Air Reduction Sales Co., 50 E. 42nd St., New York, plans construction of oxygen gas manufacturing plant, to cost $165,000. Plans by own engineering department.

ILLINOIS

BUSHNELL, ILL.—Nickelberry Food Products Co., 801 W. 40th Place, Chicago, plans a $500,000 addition to its plant here.

CHICAGO — Sam Cassel Co., 833 W. Randolph St., has awarded to Poirot Construction Co., 2001 W. Pershing Rd., a contract for a 1-story factory and office, 222 x 232 ft costing $135,000. A. Epstein, 2011 W. Pershing Rd., is engineer.

CHICAGO — White Cap Co., 1819 N. Major St., has awarded a $150,000 contract for a 2-story, 220 x 152 ft factory addition to Campbell-Lowrie-Lautermilch, 400 W. Madison St. The plumbing went to S. J. Reynolds Co., 2229 W. Ogden Ave. Architects are Olsen & Urbain, 75 E. Wacker Dr.

CHICAGO — Garden City Plating & Mfg. Co., 1430 S. Talman Ave., plans a 1-story factory to cost about $300,000.

MELROSE PARK, ILL. — Sterling Tool Products, 363 E. Ohio St., Chicago, plans to build a 1-story factory, to cost $235,000.

MONSANTO, ILL. — Monsanto Chemical Co., 1700 S. Second St., St. Louis, proposes to construct a $3 million plant here.

QUINCY, ILL.—Continental Oil Co., 100 S. Front St., will soon let contracts for a $500,000 addition to its terminal on Harrison street.

RIVERDALE, ILL. — Acme Steel Co. plans a 1-story building, 150 x 400 ft. Estimated cost is $412,275.

ROCKFORD, ILL.—Rockford Fibre Container Corp., 200 Sayre St., contemplates building a $1 million factory addition.

INDIANA

BICKNELL, IND. — Public Service Co. of Indiana, R. A. Gallagher, president, Indianapolis, plans a $5 million project with installation of 37,500 kw generating unit near Bicknell, and a 132,000 volt transmission line.

KOKOMO, IND. — Haynes Stellite Co., Harrison and Lindsay Sts., plans an alloy rolling mill on a 40-acre site west of the city to cost $620,000.

MISHAWAKA, IND. — Indiana & Michigan Electric Co., 220 W. Colfax St., South Bend, Ind., plans a 1-story power plant, a 1-story boiler plant and a 190,000 kw generator at estimated cost of $15 million. American Gas & Electric Service Corp., 30 W. Church St., New York, is consulting engineer.

LOUISIANA

NEW ORLEANS—Paragon Tool & Mfg. Co., Marcel J. Bayhi, president, 1544 Florida Ave., is having plans prepared by Allied Engineering & Construction Co., 1029 Philip St., for new plant on Industrial Canal.

MARYLAND

BALTIMORE—Zinc Chemical Co., New York, Walter C. Bennett, president, plans construction of plant for various grades of zinc sulphate, to be owned jointly by Glidden Co., which will handle production, and International Minerals & Metal Corp. and Phelps Dodge Refining Corp., which will handle sales.

MASSACHUSETTS

SPRINGFIELD, MASS. — Monsanto Chemical Co. has placed a contract with Adams & Ruxton Construction Co., 1387 Main St., for a 3-story 60 x 120 ft plant at 812 Monsanto Ave. It will cost $175,000.

MICHIGAN

DETROIT—Michigan Drill Head Co., 971 E. Eight-Mile Rd., has been formed to manufacture tools and dies. Gordon J. Burket, 17371 Pennington Dr., heads the venture which has a capital of $200,000.

DETROIT—Bernard S. Epps & Co., 821 Moran St., has been formed with 20,000 shares of stock at no par value and $50,000 capital to buy and sell steel and steel products.

DETROIT—Acme Spring Products Co., 281 W. Fort St., has been formed with capital of $50,000 to deal in metal products, by Arthur Faber.

GRAND RAPIDS, MICH.—Frank Edge Saw Mfg. Co., 549 Ottawa Ave. N. W., has been formed to manufacture saw products by Walter A. Robson, 208 Ball Park Blvd. N.W. Capitalization is $50,000.

NEW JERSEY

TRENTON, N. J. — Delaval Steam Turbine Co., 553 Nottingham Way, has named John W. Ferguson Co., 152 Market St., Paterson, N. J., builder of its $55,000 plant addition.

NEW YORK

BROOKLYN, N. Y. — American Safety Razor Corp., 315 Jay St., has had plans completed by William Higginson & Son, 101 Park Ave., New York, for altering an 8-story factory and warehouse, 71 Myrtle Ave. Cost will be $400,000.

OHIO

CLEVELAND — Basic Refractories Inc., Hanna Bldg., will construct a plant at Maple Grove, O., for about $700,000.

CLEVELAND — Star Welding & Engineering Co., 5140 Superior Ave., will build a $60,000 plant on E. 134th St. north of St. Clair Ave.

CLEVELAND—Erie Casting Co. has been incorporated by Dan Balzano, 1449 E. 115th St. The firm is planning to build a plant on Green Rd. and is now purchasing necessary machinery and equipment to start operations.

CLEVELAND—Harry Ferguson Inc., who recently bought Cleveland Pneumatic Aero Co. plant at 20001 Euclid Ave., will begin extensive alterations immediately.

COLUMBUS, O.—Ohlen-Bishop Mfg. Co., 90 Ingleside Dr., will build a 1-story factory and a 2-story office building on a 27-acre tract near here. C. M. Barr Co., 299 S. Front St., is the contractor and Sims, Cornelius & Schooler, 2901 N. High St., are the architects for the job which is estimated at $1 million.

MIDDLETOWN, O.—American Rolling Mill Co. will build a $118,700 addition to its mill.

PENNSYLVANIA

JOHNSTOWN, PA. — Bethlehem Steel Co., Bethlehem, Pa., proposes to build a 1-story mill building, an extension to a shipping and finishing building, a pump and compressor building, a boiler house and a 1-story erection plant to cost $1,988,000.

PHILADELPHIA—John E. Sjostrom Co. Inc., 1715 N. 10th St., will soon let a contract for a 3-story, 100 x 101 ft plant and 1-story 33 x 53 ft garage to cost $500,000. Balling Co., 105 S. 12th St, is the architect.

CANADA

TORONTO, ONT. — Mine Safety Appliances Co., 110 Dupont St., will build for about $75,000 a 6-story, 60 x 60 ft plant addition. Milne & Nicholis Ltd., 57 Bloor St. W., are contractors, and Prack & Prack, Pigott Bldg., Hamilton, Ont., are architects.

MONTREAL, QUE.—Standard Electric Co., 209 Craig St., W. I. Blatt, president, has awarded a $450,000 contract to J. A. Beruh, 3957 Rivard St., for erection of a 4-story 100 x 190 ft factory. Architect is R. Fisher, 784 Wiseman Ave., Outremont.

MONTREAL, QUE. — Montreal Armature Works Ltd., 279 Shannon St., has contracted with Cathcart Construction Co., 5675 Westerly Ave. for a $60,000 warehouse, 90 x 201 ft. Architect is Shorey & Co., 2048 Union Ave.